(FILE 'HOME' ENTERED AT 07:43:32 ON 06 SEP 2007)

FILE 'REGISTRY' ENTERED AT 07:43:39 ON 06 SEP 2007

L1 STRUCTURE UPLOADED

L2 34 S L1 SSS FULL

FILE 'CAPLUS' ENTERED AT 07:43:57 ON 06 SEP 2007 L3 75 S L2

FILE 'STNGUIDE' ENTERED AT 07:44:19 ON 06 SEP 2007

FILE 'REGISTRY' ENTERED AT 07:44:50 ON 06 SEP 2007

FILE 'STNGUIDE' ENTERED AT 07:45:15 ON 06 SEP 2007

FILE 'REGISTRY' ENTERED AT 07:46:22 ON 06 SEP 2007

L4 STRUCTURE UPLOADED

L5 3 S L4 SAM SUB=L2

L6 11 S L4 SSS FULL SUB=L2

L7 23 S L2 NOT L6

FILE 'CAPLUS' ENTERED AT 07:46:57 ON 06 SEP 2007 L8 72 S L7

FILE 'REGISTRY' ENTERED AT 07:47:02 ON 06 SEP 2007

FILE 'STNGUIDE' ENTERED AT 07:47:23 ON 06 SEP 2007

FILE 'REGISTRY' ENTERED AT 07:48:11 ON 06 SEP 2007

FILE 'CAPLUS' ENTERED AT 07:48:25 ON 06 SEP 2007 L9 63 S L8 AND PREP/RL

FILE 'REGISTRY' ENTERED AT 07:49:06 ON 06 SEP 2007

FILE 'CAPLUS' ENTERED AT 07:49:27 ON 06 SEP 2007 2 S US200!-541021/APPS

L11 62 S L9 NOT L10

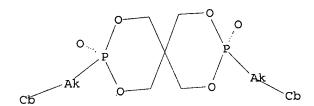
FILE 'REGISTRY' ENTERED AT 07:50:09 ON 06 SEP 2007

=> d l1

L10

L1 HAS NO ANSWERS

L1 STR



Structure attributes must be viewed using STN Express query preparation.

=> d 14

L4 HAS NO ANSWERS

L4

STR

Structure attributes must be viewed using STN Express query preparation.

Match level :

17:

18:

Generic attributes :

Saturation

Saturation

```
chain nodes :
    12 13 14 15 17 18
ring nodes :
    1 2 3 4 5 6 7 8 9 10 11
chain bonds :
    5-13 5-15 9-12 9-14 14-18 15-17
ring bonds :
    1-2 1-6 2-3 2-7 2-11 3-4 4-5 5-6 7-8 8-9 9-10 10-11
exact/norm bonds :
    1-2 \quad 1-6 \quad 2-3 \quad 2-7 \quad 2-11 \quad 3-4 \quad 4-5 \quad 5-6 \quad 5-13 \quad 5-15 \quad 7-8 \quad 8-9 \quad 9-10 \quad 9-12 \quad 9-14 \quad 10-11
    14-18 15-17
isolated ring systems :
    containing 1 :
```

1:Atom 2:Atom 3:Atom 4:Atom 5:Atom 6:Atom 7:Atom 8:Atom 9:Atom 10:Atom 11:Atom

12:CLASS 13:CLASS 14:CLASS 15:CLASS 17:Atom 18:Atom

: Unsaturated

: Unsaturated

chain nodes :

Generic attributes :

Saturation

Saturation

17:

18:

```
12 13 14 15 17 18 19 20

ring nodes:

1 2 3 4 5 6 7 8 9 10 11

chain bonds:

5-13 5-15 9-12 9-14 14-18 14-20 15-17 15-19

ring bonds:

1-2 1-6 2-3 2-7 2-11 3-4 4-5 5-6 7-8 8-9 9-10 10-11

exact/norm bonds:

1-2 1-6 2-3 2-7 2-11 3-4 4-5 5-6 5-13 5-15 7-8 8-9 9-10 9-12 9-14 10-11

14-18 14-20 15-17 15-19

isolated ring systems:

containing 1:
```

1:Atom 2:Atom 3:Atom 4:Atom 5:Atom 6:Atom 7:Atom 8:Atom 9:Atom 10:Atom 11:Atom

12:CLASS 13:CLASS 14:CLASS 15:CLASS 17:Atom 18:Atom 19:CLASS 20:CLASS

: Unsaturated

: Unsaturated

. -. -4

2 of 76

ANSHER_1_OP_62 — CAPLUST COPYRIGHT 20077ACSFONESTN. 2006-99110 CAPTUS UII-text
145:165948
Halogen-free Liame-recardant and heat-resistant epoxy resin compositions and their laminates
Yamanaka, Katsuhiro
Reininachonicatasetedomo apair
Jpn. Kokai Tokkyo Koho, 23 pp.
CODEN: UKXXAF
Patent
Japanese
CNT 1
PATENT NO. KIND DATE APPLICATION NO. DATE

KIND 20060727 JP 2006193548 JP 2005-3637 MARPAT 145:168548

The compns. contain (A) 100 parts epoxy resins, (B) 1-200 parts hardeners, and (C) 0.1-200 parts organophosphorus compds. represented by the general formula 1 (X1. X2 = aromatic group-substituted alkyl represented by the general formula (AL) (Ar)n; L = C1-5 aliphatic hydrocarbyl; Ar = Ph, naphthyl, or anthryl whose aromatic may be substituted; n = 1-3 integer; Ar bonds to any C atom in AL). Thus, a 50%-nonvolatile MEK-based varnish comprising Epiclon N 770 (A) 100. dicyandiamide 5.5, 2.4,8.10-tetraoxa-3,9-dioxide 30, and 2-ethyl-4-methylimidazole 0.1 part was impregnated into glass cloths to give prepregs with resin content 44.4%, 8 pieces of which were stacked together, sandwiched with electrolytic Cu (foils, and hot pressed to give a 1.6-mm thick Cu-clad laminate showing flame retardance V-0 (UL-94) and good solder heat resistance (JIS C 6481). with electrolytic Cu foils, and hot pressed to give a 1.6-mm thick Cu-clad Laminate showing flame retardance V-0 (UL-94) and good solder heat resista (JIS c 6481), 20544-27-09 (2294-92-39 475101-74-79 475101-76-99 Rb: IMP (Industrial manufacture); MOA (Modifier or additive use); PREP (Frephration); USES (Uses) (flame retardant; halogen-free flame-retardant and heat-resistant epoxy resin compns. and their Cu clad laminates) 20544-37-0 CAPLUS 2.4,8,10-Tetracax-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

Results 10/541021 ## 30 f 76

GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LK, LK, LS, LT, LU, LV, MA, MD, MG, MK, MN, MM, MX, MZ, NT, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

RM: BM, GH, GM, KE, LS, MM, MZ, SD, SL, SZ, TZ, UG, ZM, ZH, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, C1, CM, GA, GN, GG, MM, ML, MR, NE, SN, TD, TG

AU 2001299015 A1 20050629 AU 2003-289015 20031210

EP 1693412 A1 20060823 EP 2003-778782 20031210

EP 1693412 A1 200700707 CF, RG, GB, GT, TL, LI, LU, NL, SE, MC, PT, IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, SK

CN 1910230 A 200701217 US®2006ESS21Q89 20060608

MO 2003-JP15799 A 20031210 3 of 76 US 2007112108 PRAI WO 2003-JP15799 MARPAT 143:79071

A styrene resin composition which is excellent in thermal stability, hue, flowability, and heat resistance and further has flame retardancy; and a molded article formed therefrom which has an excellent appearance. The resin composition comprises (A) 100 parts styrene resins, [8] 0-100 parts polyphenylene ether resins, and (C) 1-100 parts organophosphorus compds. represented formula (f), wherein Arl and Ar 2 - Ph or substituted phenyl; satisfying the following requirements (i) the amount of the residue left after heating at \$00° \$10\$, (ii) the MPLC purity ≥90\$, and (iii) the acid value ≤0.5 mg-KOH/9.

THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD ALL CITATIONS AVAILABLE IN THE RE FORMAT RE.CNT 12

ANSWERCESOF 621 CASSUS COPYRIGHT 2007 ACS ON STR 141:350867

62284-92-8 CAPLUS 2.4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, J,9-bis(2-phenylethyl)-,3,9-dioxide (9CI) (CA INDEX NAME)

475101-74-7 CAPLUS 2.4.8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethyl)-,3,9-dioxide (9C1) (CA INDEX NAME)

475101-76-9 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

ANSMERICALOF 62 CAPEUS FICOSYRIGHT SOOT ACSON STN

'2005:547658 CAPLUS <u>Full-text</u> 143:79071 Flame-retardant styrene resin compositions and molded article obtained

Plane-retardant styrene restn compositions and molded article obtained theorefrom Yamanaka, Katsuhiro, Imamura, Koichi; Tanabe, Seiichi; Taketani, Yutaka desidnakiadisalisatus yawana per Int. Appl., 53 pp. CODEN: PIXXD2 Patent IN PA SO

DT

LA Japanese FAN.CNT 1

PATENT NO. KIND DATE APPLICATION NO. DATE PATENT NO. KIND DAIE APPLICATION NO. DAIE

NO 2005056671 A1 20050623 NO 2003-JP15799 1051210

H: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BM, BY, BZ, CA, CH,
CN, CO, CR, CU, C2, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD,

Results 10/541021

4 of 76

Halogen-free flame-retardant styrene resin composition Endo, Shigeru

PS_JOBALCOFPOINTS_JAPAN
PS_TIRT APPL. 69 PP
CODEN: PIXXD2
PALENT
JAPANESE
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CTT. 10 PRIXED2
PALENT
JAPANESE

FAN.	CNT	1																
	PA	TENT	NO.			KIN	D	DATE			APPL	ICAT	ION	NO.		D.	ATE	
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PI	WO	2004	0878	09		A1		2004	1014		WO 2	004 -	JP43	37		st2	6 540:	32 B
		₩:	AE,	AG,	AL,	AM,	AT,	ΑU,	AZ,	BA,	88,	BG.	BR,	BW,	BY,	ВŹ,	CA,	CH.
			CN,	co,	CR,	Cυ,	CZ,	DE,	DK,	DM,	DZ,	EC,	EE,	EG,	ES,	FI,	GB,	GD,
			GE,	GH,	GM,	HR,	HU,	ID,	IL,	IN,	IS,	JP,	KE,	KG,	KP,	KR,	KZ,	LC.
			LK,	LR,	LS,	LT,	LU,	LV,	MA,	MD,	MG,	MK,	MN,	MW,	MX,	MZ,	ΝA,	NI.
			NO,	NŽ,	OM,	PG,	PH,	PL,	PT,	RO,	RU,	SC,	SD,	SE,	SG,	SK,	SL,	SY
			TJ,	TM,	TN,	TR,	TT,	TZ,	UA,	UG,	US,	UZ,	VC,	VN,	YU,	ZA,	ZM,	ZW
		RW:	B₩,	GH,	GM,	KE,	LS,	MW,	MZ,	SD,	SL,	SZ,	TZ,	UG,	ZM,	ZW,	AM,	AZ,
			BY,	KG,	KZ,	MD,	RU,	TJ,	TM,	AŤ,	BE,	BG,	CH,	CY,	CZ,	DE,	DK,	EE.
			ES,	FI,	FR,	GB,	GR,	HU,	IE,	IT,	LU,	MC,	NL,	PL,	PT,	RO,	SE,	SI.
			SK,	TR,	BF,	BJ,	CF,	œ,	CI,	CM,	GA,	GN,	GQ,	GW,	ML,	MR,	NE,	SN.
			TD,	TG														
	CN	1768	110			Α		2006	0503		CN 2	004-	8000	8516		2	0040	326
	US	2006	2588	16		A1		2006	1116		µ 9≢2	0052	5509	46		2	0050	928

A A A A US 2006258816 20061116

US 2006258816 A1 20061116 #3#2005%45.0946 20050928

PARI JP 2001-90859 A 20010128

JP 2001-356211 A 2001016

JP 2001-357404 A 20031017

MO 2004-JP4337 W 20040326

OS MARPAT 141:350867

Strife flame-retardant styrene resin composition comprises (A) 100 parts of a styrene resin having weight retention at 500° of 520% and (B) 0.5-50 parts of halogen-free (quasi) sphere-shaped flame-retardant particles, wherein the component (B) with mol. weight of 200-2,000 and area-average diameter of 0.01component (8) with mol. weight of 200-2,000 and area-average diameter of 0.01-3 µm have been dispersed in (A), and have weight retention at 500° of 2204 and m.p. of 100°-400°. Thus, a composition was formulated from low-cia polybutadiene rubber-modified α-Me styrene dimer-styrene copolymer 100 and dibenzyl pentaerythritol diphosphonate 2 parts, to give a sample showing UL-94 flame resistance V-2. 20544-27-0 62284-92. RL: MOA (Modifier or additive use); USES (Uses) (halogen-free flame-retardant styrene resin composition) 20544-37-0 CAPLUS 2.4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

62284-92-6 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD ALL CITATIONS AVAILABLE IN THE RE FORMAT RE.CNT

ANSHER 4 OF 6% CAPLUS COPYRIGHT 2007 ASS ON SUN CAPLUS Full-text

141:124589

141:124599
Fire-resistant resin compositions and molded products therefrom Yamanaka, Katsuhiro; Taketani, Yutaka

Tangking Glegn MCANG MCAG MCAG Agana
Jpn. Kokai Tokkyo Koho, 38 pp.
CODEN: JKXXAF

PA SO

DT Patent

DT Patent LA Japanese FAN.CNT 1 PATENT NO.

APPLICATION NO. KIND ----DATE DATE P1 JP 2004210968 PRAI JP 2003-176 OS MARPAT 141:124589 20040729 JP 2003-176 **420030309**

MARPAT 141:124589

The compns. comprise (A) 100 parts resin components containing 260% aromatic polyesters, (B) 1-100 parts 3-X1-9-X2-2,4,8,10-terraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide (X1, X2 = (AL) (Ar)n, AL = C1-5 branched or linear aliphatic hydrocarbon, Ar = (un)substituted Ph, naphthyl, anthryl, n = 1-3], (C) 0.1-100 parts compds. containing 22 OH, (D) 0-50 parts fireproofing resins, and (E) 0-200 parts fillers. Thus, PBT (TRB-H) 100, 3,9-dibenzyl-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide (preparation described) 20, and pentaerythritol 3 parts were blended, pelletized, dried, and injection molded to give a test piece showing UL 94 fire resistance rating V-0 and oxygen index 29.0%.
2504-43-70, 3,9-0lbenzyl-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide 62064-93-89, 3,9-dioxide 475101 74-79, 3,9-815(a-methylbenzyl)-2,4,8,10-

3.9-8is(2-phenylethyl)-2.4,8,10-tetraoxa-3,9-diphosphaspiro(5.5]undecane
3,9-dioxide 175101 74-7P, 3,9-8is(a-methylbenzyl)-2,4,8,10tetraoxa-3,9-diphosphaspiro(5.5]undecane 3,9-dioxide (75101-76-2P)
3,9-8is(diphosphaspiro(5.5)undecane 3,9-dioxide (75101-76-2P)
diphosphaspiro(5.5)undecane 3,9-dioxide
RL: IMF (Industrial manufacture); MOA (Modifier or additive use);
PROP (Houghartion); USES (Uses)
(halogen-free fire-resistant aromatic polyester compns.)
20544-37-0 CAPUUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-,
3,9-dioxide (CA INDEX NAME)

62284-92-8 CAPLUS

Its 10/541021

To 176

branched or linear aliphatic hydrocarbon, Ar = (un)substituted Ph, naphthyl, anthryl, n > 1-3], (C) 0.1-100 parts compds, containing N, (D) 0.1-100 parts alkali metal salts and/or alkaline earth metal salts, (E) 0-50 parts (ireproofing resins, and (F) 0-200 parts (illers, Thus, PBT (TRB-H) 100, 3,9-dibenzyl-2.4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide (preparation described) 20, melamine cyanurate (MC 510) 5, and CaCOJ 3 parts were blended, pelletized, dried, and injection molded to give a test piece showing UL 34 fire resistance rating V-0 and good hydrolysis resistance. 20544 37-06, 3,9-dibenzyl-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide %2784-37-2-3F, 3,9-Bis (2-phenylethyl)-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide 475101-74-9P 3,9-Bis (diphosphaspiro[5.5]undecane 3,9-dioxide 475101-74-9P 3,9-dio 7 of 76

62284-92-8 CAPLUS 2,4,8,10-Tetraoxe-3,9-diphosphaspiro[5.5]undecane, 3,9-bis{2-phenylethyl}-,3,9-dioxide (9C1) (CA INDEX NAME)

_ CH2- CH2- Ph

475101-74-7 CAPLUS 2.4.8.10-Tetroxox-3.9-diphosphaspiro[5.5]undecane, 3.9-bis(1-phenylethyl)-3.39-dioxide (9CI) (CA INDEX NAME)

475101-76-9 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-

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6 of 76

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9Cl) (CA INDEX NAME)

475101-74-7 CAPLUS 2.4.8,10-Tetroxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethyl)-, 3,9-dioxide (9C1) (CA INDEX NAME)

475101-76-9 CAPLUS
2.4.8.10-Tetraoxa-3,9-diphosphaspiro(5.5|undecane, 3.9-bis(diphenylmethyl)-, 3.9-dioxide (9CI) (CA INDEX NAME)

NAMESTE SOFICE CAPIUS COPYRIGHT 2007 ACS on 67N 2004:549757 CAPLUS Full-text 141:89947 Halogen-free, tire-resistant resin compositions and molded products DN TI

hardgen-rice, tite-resistant restrict therefrom Yamanaka, Katsuhiro, Taketani, Yutaka (cijin-chemical/aliddin-rapao Jpn. Kokai Tokkyo Koho, 42 pp. CODEN. JKXXAF Patent

DT

Japanese

FAN, CNT 1

PATENT NO. KIND DATE APPLICATION NO. DATE

PI JP 2004189822 A 20040708 JP 2002-357816 20021210
PRAI JP 2002-357816 70034210

S MARPAT 141:89947

AB The compna. comprise (A) 100 parts resin components containing 260% aromatic polyesters, (B) 1-100 parts a J.X.1-9.X2-2.4.8.10-tetraoxa-3.9-diphosphaspiro(5.5)undecame 3,9-dioxide [X1, X2 = (AL)(Ar)n; AL = C1-5

Results 10/541021

8 of 76

, 3,9-dioxide (9CI) (CA INDEX NAME)

MAY ANSWER 6 OF 62 CABLUS COPYRIGHT 2007 AGS OR SER DN TI

Halogen-free, fire-resistant resin compositions and molded products Thereform
Yamanaka, Katsuhiro; Taketani, Yutaka
Tanungangangangangangangan Uapan
Jpn. Kokai Tokkyo Koho, 44 pp.
CODEN: JKXXAF

DT Patent

LA Japanese FAN.CNT 1

APPLICATION NO. PATENT NO. DATE KIND DATE PI JP 2004131580 PRAI JP 2002-297127 Α 20040430 JP 2002-297127 20021010 20021010

MARPAT 140:358244

I P 2002-297127

ARRPAT 140:158244
The compns. comprise (A) 100 parts a 3.9-dioxo-2.4.8.10-tetraoxa-3.9-diphosphaspiro[5.5] undecane 3.9-diaralkyl derivs., (C) 0.1-100 parts N-containing compds., (D) 0-50 parts fireproofing resins, and (E) 0-200 parts N-containing compds., (D) 0-50 parts fireproofing resins, and (E) 0-200 parts fillers. Thus, PBT (TRB-H) 100, 3.9-dibaled (preparation described) 20, and melamine cyanurate (MC 610) 5 parts were blended, pelletized, dried, and injection molded to give a test piece showing UL 94 fire resistance rating V-0 and 0 index 29.3%.

1054: 17.9P. 3.9-Dibenzyl-2.4.8.10-tetraoxa-3.9-diphosphaspiro[5.5] undecane 3.9-dioxide 62284-8225P.

3.9-Bis(2-phenylethyl)-2.4.8.10-tetraoxa-3.9-diphosphaspiro[5.5] undecane 3.9-dioxide 175121 74 7P. 3.9-Bis(u-methylbenzyl)-2.4.8.10-tetraoxa-3.9-diphosphaspiro[5.5] undecane 3.9-dioxide 175121 74 7P. 3.9-Bis(u-methylbenzyl)-2.4.8.10-tetraoxa-3.9-diphosphaspiro[5.5] undecane 3.9-dioxide 175121 (diphenylmethyl)-2.4.8.10-tetraoxa-3.9-dioxide 175121 (diphenylmethyl)-2.4.8.10-tetraoxa-3.9-diphosphaspiro[5.5] undecane 3.9-dioxide 175121 (diphenylmethyl)-2.4.8.10-tetraoxa-3.9-diphosphaspiro[5.5] undecane 3.9-bis(phenylmethyl)-3.4.8.10-Tetraoxa-3.9-diphosphaspiro[5.5] undecane 3.

20544-37-0 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro{5.5}undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

CH2-Ph

62284-92-8 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5,5]undecane, 3,9-bis(2-phenylethyl)-3,9-dioxide (9CI) (CA INDEX NAME)

475101-74-7 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro (5.5) undecane, 3,9-bis (1-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

475101-76-9 CAPLUS
2.4.8.10-Tetraoxe-3.9-diphosphaspiro(5.5)undecane, 3.9-bis(diphenylmethyl)3.9-dioxide (9CI) (CA INDEX NAME)

ANSWER DEOPTE CAPTUS COPYRIGHT 2007 ACS ON STN

ANSKAR MANAGE CAPUS FULL-text
2004:310197 CAPUUS FULL-text
140:32237
Halogen-tree fire-resistant polyamide compositions, moldings therefrom, and spiro bisaralkylphosphonate fireproofing agents therefor Yamanaka, Katsuhiro, Taketani, Yutaka
931577 Chosicologica (16777 Japan Jpn. Kokai Tokkyo Koho, 30 pp. CODEN: JKKXAP
PATENT

IN PA SO

DT Patent

LA Japanese FAN.CNT 1

PATENT NO. KIND DATE 20040415 JP 2004115763

C20020930

APPLICATION NO.

DATE JP 2002-285207 20020930

PRAI JP 2002-285207 OS MARPAT 140:322337

Results 10/541021

11 of 76

475101-76-9 CAPLUS

2.4.8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

AN 2004:271545 CAPLUS FUTTIEXT

AN 140:103858
TI Photochemical preparation of high-purity spiro-pentaerythritol bis(phosphonate)s

Photochemical preparation of high-purity spiro-pentaerythritol
bis(phosphonate)s

IN Yansgida Takatsune; Imamura, Koichi; Tanabe, Seiichi; Taketani, Yutaka
reight-chamicalsitad...Japan
SO Jpn. Kokai Tokkyo Koho, 28 pp.
CODEN: JKXAF

DT Patent
LA Japanese
FANL.CNT I
PATENT NO. KIND DATE APPLICATION NO. DATE

PI JP 2004099565 PRAI JP 2002-266622 OS MARPAT 140:303858

KIND ----

20040402 (20020912-

JP 2002-266622

Title compds. I [Ar4, Ar5 = Cs-20 (un)substituted aryl, Z4, Z5 = CR13R14, CR15R15CR17R18, R13, R14 = H, Cs-20 (un)substituted aryl, C1-20 (un)saturated hydrocarbyl, R15-R18 = similar group as in R13, R14], useful as halogen-free fireproofing agents, etc., are prepared by chlorination of pentaerythritol with PC13 in the presence of inert solvents, successive treatment with Art210R

Results 10/541021

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The compns. comprise 100:(1-100) (part) (A) polyamides and (B) I [X1, X2 = RArn; R = (branched) C1-5 aliphatic hydrocarbyl(ene); Ar = (substituted) Ph, naphthyl, or anthryl substituted on any C in R, n = 1-3]. Moldings from the compns. are useful for automotive elec. parts, etc. Thus, a 100:15 mixture of Durethan A 30 (nylon 66) and 2,4,8,10-tetraoxa-3,9-diphosphaspiro(15.5) undecane 3,9-dibenzyl-3,9-dioxide (prepared from pentaerythritol, PCl3, and BnBr) was injection molded to give a specimen showing UL 94 fire resistance rating V-0. 2054+-37-0F 62084-32-8F 475101-74-79 475101-76-9P, 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5] undecane 3,9-bis(diphenylmethyl)-3,9-dioxide
RL: IMF (Industrial manufacture), MOA (Modifier or additive use), TEM (Technical or engineered material use), FREP (Preparation), USES (Uses)
[fireproofing agents; halogen-free fire-resistant polyamide compns. containing spiro bisaralkylphosphonate fireproofing agents useful for automobile elec. parts)
2.644-37-0 CAPLUS
2.44,8,10-Tetraoxa-3,9-diphosphaspiro[5.5] undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME) AB

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

CH2-CH2-Ph

475101-74-7 CAPLUS 2.4,8.10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

Results 10/541021

12 of 76

[Ar] = C6-20 (un)substituted aryl; 21 = similar group as in 24, 25], followed by UV irradiation of the resulting pentaerythritol bis(phosphite)s II (Ar2, Ar3 = similar group as in Ar1; 22, 23 = similar group as in 21). Thus, Pentarit S (pentaerythritol) was chlorinated with PC13, condensed with PhCH2OH, and UV irradiated to give 80.1% I (Ar4Z4 = Ar5Z5 = PhCH2) with 99.1%

purity. 20544-37-0P

RL: IMF (Industrial manufacture); SPN (Synthetic preparation); FREP

(Preparation) (Preparation)
(One-poot preparation of high-purity spiro-pentaerythritol bis(phosphonate)s
via bis(phosphite)s)
2044-37-0 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

Solvents and Spirotenastykintol diphospholates using Reycles solvents Tanabe, Seiichi, Ando, Shinichi, Imamura, Koichi, Tando, Kazushi, Yanagida, Takatsune, Taketani, Yutaka MajingChemicalerLtd. 2020, 202

Jpn. Kokal To CODEN: JKXXAP Patent Japanese

LA Jaj FAN.CNT ONT 1 PATENT NO. JP 2004099566

PI JP 2004099566 PRAI JP 2002-266623

KIND

DATE

APPLICATION NO. 20040402 JP 2002-266623

DATE 20020912

Its 10/541021

Title compds. I [Ar4, Ar5 = C6-20 (un) substituted aryl; 24, 25 = CR14R15, CR16R17CR16R19; R14, R15 = N, C6-20 (un) substituted aryl, C1-20 (un) saturated hydrocarbyl; R16-R19 = similar group as in R14, R15], useful for fireproofing agents, etc., are prepared by chlorination of pentaerythricol (II) with PCl3 in the presence of inert solvents, successive treatment with Ar1210H [Ar1 = C6-20 (un) substituted aryl, 21 = similar group as in Z4, Z5] in the presence of organic bases, removal of the bases, their salts, and the solvents, and treatment of the resulting spiro-pentaerythricol diphosphices III (Ar2, Ar3 = similar group as in Ar1; Z2, Z3 = similar group as in Z1) with R13X [R13 = alkali metal, C1-20 alkyl, aralkyl, aryl, etc.; X = Br, iodine) at 80-300°. The removed solvents are recovered and reused in the above process. Thus, II was chlorinated with PCl3 in pyridine and xylene, condensed with PhCR20H, filtered, the filtrate washed with 1N NaON, the organic phase evaporated, and refluxed with PhCR2BH to give 89% I (Ar424 = Ar525 = PhCR2) with 99% purity. II was similarly reacted in recovered solvent to give the product without decline in yield or purity.

20544 37 %P, 39-Bis(phenylmethyl)-3.9-dioxo-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5.5) jundecane

RL: IMF (Industrial manufacture); fREP (Preparation); (preparation of spiro-pentaerythritol diphosphonates from pentaerythritol using recycled solvents)

2044-77-70 CAPLUS

20544-37-0 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

AN 2007-P645-19 CAPHUS COPYRIGHT 2007 AGS ON STEN

140:304654

DN TI Preparation of spiro-pentaerythritol diphosphonates using recovered

IN

halides
Imamura, Koichi, Ando, Shinichi; Tanabe, Seiichi; Tando, Kazushi;
Yanagida, Takataune; Taketani, Yutaka
Tashihu Chenicala Ledon Capan,
Jpn. Kokai Tokkyo Koho, 20 pp.
CODEN: JKXXAF
Patent
Japanese
CNT 1

CNT 1 PATENT NO. JP 2004099550

20040402 20020011 KIND JP 2002-265180 MARPAT 140:304654

APPLICATION NO. JP 2002-265180

DATE 20020911

Results 10/541021

15 of 76

The compds. I (Ar1, Ar2 = C6-20 (un)substituted aryl, 21, 22 = CR1R2, CR3R4CR5R6; R1, R2 = H, C6-20 (un)substituted aryl, C1-20 (un)saturated hydrocarbyl; R3-R6 = H, C6-20 (un)substituted aryl, C7-30 (un)substituted aryl, C1-20 (un)substituted aryl, C1-20 (un)substituted aryl, C1-20 (un)saturated hydrocarbyll, useful as fireproofing agents, are purified by washing crude I (Ar1, Ar2, Z1, Z2 = same as above) with washing solvents containing 250 weight% organic solvents having relative permittivity 10-40 at 25°. The washing solvents are allowed to be reused when they still contain 250 weight% of the organic solvents after using. 3,9-Bis((phenylmethyl)oxy)-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane was treated with benzyl bromide at 120° for 12 h to give I (21 = 22 = CH2, Ar1 = Ar2 = Ph) with 92.0% purity, which was washed with MeOH and filtered to give 30.6 g II with 93.3% purity.

20544-37-PP
RE: IMP (Industrial manufacture); MOA (Modifier or additive use); PUR
(Purification or recovery); PREF (Preparation); USES (Uses)
(purification of pentaerythritol spirocyclic diphosphonates as fireproofing (purilication of pentaerythritol spirocyclic diphosphonates as fireproo agents with washing solvents containing ≥50% organic solvents having predectd. relative permittivity) 20544-37-0 CAPLUS 2.4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

ANSEER 12 OF 62 GAPLUS COPYRIGHT 2007 AGS ON STN 2004 1217191 CAPLUS Full-text

140:253718

140:253718

Preparation of high-purity pentaerythritol spirocyclic diphosphonates without purification of intermediates
Tanabe, Seidchi, Yanagida, Takatsune; Tando, Kazushi, Imamura, Koichi,
Ando, Shinichi, Taketani, Yutaka
Teijin Chemicais Letd., Japan
Jpn. Kokai Tokkyo Koho, 23 pp.
CODEN: JKXXAF
Patent
Japanese
CWT 1

DT LA FAN

PATENT NO. DATE APPLICATION NO DATE JP 2004083538 20040318 JP 2002-263848 20020910 Title compds, 1 [Ar3, Ar4 = C6-20 (un)substituted aryl; Z3, Z4 = CR7R8, CR9R10CR11R12; R7, R8 = H, C6-20 (un)substituted aryl, C1-20 (un)saturated hydrocarbyl; R9-R12 = similar group as in R7, R8], useful for (freproofing agents, etc., are prepared by treatment of apiro-pentaerythricol diphosphites II (Ar1, Ar2 = similar group as in Ar3, Ar4; Z1, Z2 = similar group as in Z3, Z4) with R13x (R13 = C1-10 alkyl, aralkyl, aryl, alkali metal, etc; X = Br. iodine) at 80-300°, wherein the halides are recovered and reused in the reaction. Thus, II (Ar1Z1 = Ar2Z2 = PhCHZ) was refluxed with PhCHZBr in xylene for 4 h to give 91% I (Ar3Z3 = Ar4Z4 = PhCHZ) with >99% purity. PhCHZBr was recovered and reused in the rearrangement to give the product without decline in yield or purity. [1944-27 % 3, 3-9-Bisphenylmethyl)-3, 9-dioxo-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5,5]undecane
RL: IMF (Industrial manufacture); PREP (Frencia, 100)

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2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

ANSWER IN OF 62 CAPLUS COPYRIGHT 2007 AGS ON STN 2004; 268542 CAPLUS Full-text

Full-text 140:288188

TI TI Purification of pentaerythritol spirocyclic diphosphonates as fireproof agents for polymers

IN Yanagida, Takatsune; Ando, Shinichi; Imamura, Koichi; Tanabe, Seiichi; Tando, Kazushi; Takateani, Yutaka
PA TeadigingChemispaiseIIGolemiopain
SO Jpn. Kokai Tokkyo Koho, 22 pp.
CODEN: JMXXAF

DT Patent
LA Japanese
FAN.CNI 1 Purification of pentaerythritol spirocyclic diphosphonates as fireproofing

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE

PΙ	JP 2004099526	A	20040402	JP 2002-263849	20020910
PRAI	JP 2002-263849		20020910		
0.5	MARPAT 140:288188				

Results 10/541021 PRAI JP 2002-194712 A 230020000 OS CASREACT 140:253718; MARPAT 140:253718

$$Ar^{1} = \begin{cases} R^{3} & R^{3} \\ \vdots & \vdots \\ R^{2} & R^{4} \end{cases}$$

The diphosphonates I (Arl, Ar2 = CS-20 aryl, R1-R8 = H, C6-20 aryl, C7-30 aralkyl, C1-20 hydrocarbyl), useful as polymer fireproofing agents, are prepared by treatment of pentaerythritol (II) with PCl3 in nonreactive solvents, treatment of the reaction mixts. with ArcRiR2Cr3/R4OH (Ar = CS-20 aryl, R1-R4 = same as above) in the presence of organic bases, removal of the organic bases and their salts from the reaction mixts. containing diphosphites III (Arl, Ar2, R1-R8 = same as above), and heating the reaction mixts in the presence of RX (R = alkali metal, C1-20 alkyl, aralkyl, etc; X = Br, iodide) at 80-300°. Thus, II was treated with PCl3 in o-dichlorobenzene, treated with PCHCHCHOZOH in the presence of pyridine, filtered, and the (Iltrate was washed with aqueous NaOH solution and heated in the presence of PCHCHCHAZBr at 130° to give 90-31 (R1-R8 = H, Ar1 = Ar2 = Ph) with purity 99-34.

42246-VIL-8F, 3,9-81s(2-phenylethyl)-3,9-dioxo-2,4,8,10-tetraoxa-3,9-diphosphaspirolS-slundecame
RE: IMF (Industrial manufacture); SPN (Synthetic preparation); FPFF irreparation:

(proparation) of high-purity pentaerythritol spirocyclic diphosphonates as polymer fireproofing agents without purification of intermediates) 62284-92-8 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

ANSWER 19 OF 62 CAPLUS COPYRIGHT 2007 AGS ON STR 2004:217190 CAPLUS Full-text

DN TI 140:253717
Preparation of high-purity pentaerythritol spirocyclic bis(phosphonate)s without purification of intermediates
Tanabe, Seitchi; Yanagida, Takatsune; Tando, Kazushi; [mamura, Koichi; Ando, Shinichi; Taketani, Yuteka
Teijin Chemicais Ltd., Japan
Jpn. Kokai Tokkyo Koho, 24 pp.

IN

Results 10/541021 17 of 76

CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1
PATENT NO.

APPLICATION NO. DATE PI JP 2004083537 A 20040318 PRAI JP 2002-194711 A 20020031 OS CASREACT 140:253717, MARPAT 140:253717

(Preparation)

(preparation of high-purity pentaerythritol spirocyclic bis(phosphonate)s

polymer fireproofing agents without purification of intermediates) 20544-37-0 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5]undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

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Rusu	lts 10/541021		19 of 76						
les an									
	ANGWERN US DP 5 2 C	APLUE	ON THE PARTY	U. ACS.OR.SIN					
AN		a karr	-text	<u>-</u>					
DN	140:182447								
TI	Halogen-free fire-	resista:	nt aromatic	polyester-based resin o	compositions				
	and their moldings								
IN	Yamanaka, Katsuhiro; Taketani, Yutaka								
PA	Teljin Chemicals L	td., Ja	pan						
SO	Jpn. Kokai Tokkyo	Koho. 3	6 pp.						
	CODEN: JKXXAF								
DТ	Patent								
LA	Japanese								
	CNT 1								
FAM.		W.T.	D. 777						
	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE				
PΙ	JP 2004051916	A	20040219	JP 2002-214950	20020724				
PRAI	JP 2002-214950		20020724						
os	MARPAT 140:182447								
GI									

Title compns., also having good hydrolysis resistance, comprise 100 parts resins containing 260% aromatic polyesters, 1-100 parts organic phosphates I [R1, R4 = H, C1-5 aliphatic hydrocarbyl; R3, R6 = C1-5 aliphatic hydrocarbyl; R2, R5 = (substituted) Ph, (substituted) anhthyl, (substituted) anthryl, 0.1-100 parts alkali and/or alkaline earth metal salts, 0-50 parts (ireproof improver resins, and 0-200 parts fillers. A composition containing TRB+H 100, 2.4,8,10-tetrsoxa-3,9-diphosphaspiro[5,5]undecane 3,9-di-α- methylbenzyl-3,9-dioxide (prepared from pentaerythritol, PC13, and 1-phenylethyl bromide) 15, and CaC03 5 parts was extruded and molded into a test piece showing UL94 test (for 1.6-mm thickness) V-0 and flexural strength retention ≥70% after 24 h under 120° and 100% relative humidity.
475101-74-79
REL TMP (Industrial manufacture); MOA (Modifier or additive use);
PREP (freparation); USES (Uses)
(diphosphaspiro compound- and alkali (or alkaline earth) salt-containing atic

aromatic

polyester-based compns. with fire and hydrolysis resistance) 475101-74-7 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(1-phenylethy1)-, 3,9-dioxide (9CI) (CA INDEX NAME)

Results 10/541021 18 of 76

ALIS IN/SAIDZI 18-01/0
Halogen-free fire-resistant aromatic polyester-based resin compositions and their moldings
Yamanaka, Katsuhiro, Taketani, Yutaka
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 37 pp.
CODEN: JKKXAF
PAtent
Japanese
CNT 1
PATENT NO. KIND DATE APPLICATION NO. DATE TI KIND ----PI JP 2004051917 PRAI JP 2002-214951 OS MARPAT 140:182448 GI JP 2002-214951 20020724

Title compns., also having good hydrolysis resistance, comprise 100 parts

aromatic

polyester-based compns. with fire and hydrolysis resistance) 475101-76-9 CAPLUS

2.4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

Results 10/541021 20 of 76

ANSWER 18 OF 62 CAPLUS COPYRIGHT 2000 ACS CONSTN

2004:139266 CAPLUS Full-text 140:182441

Halogen-free fire-resistant polymer compositions and their moldings with

Malogen-free tire-resistant polymer of good hydrolysis resistance Yamanaka, Katsuhiro, Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 37 pp. CODEN: JKXXAF

CODEN: JAX DT Patent LA Japanese FAN.CNT 1 PATENT NO. DT LA

KIND DATE APPLICATION NO. DATE PI JP 2004051819 PRAI JP 2002-212260 OS MARPAT 140:182441 GI 20040219 JP 2002-212260 20020722

The compns. comprise (a) 100 parts polymers containing 260% aromatic polyesters, (b) 1-100 parts organic P compds. I (Arl, Ar2 = (substituted) Ph. naphthyl, anthryl; R1-R4 = H. C1-5 aliphatic hydrocarbon group, (substituted) Ph. naphthyl, anthryl; All, Al2 = C1-5 aliphatic hydrocarbon group, Ar3, Ar4 = (substituted) Ph. naphthyl, anthryl; All, Al2 = C1-5 aliphatic hydrocarbon group, Ar3, Ar4 = (substituted) Ph. naphthyl, anthryl; p. q = 0-31, (c) 0.1-100 parts alkali metal salts and/or alkaline earth metal salts, (d) 0-50 parts fire resistance-improving polymers, (e) 0-200 parts fillers, and optionally (f) 0.01-10 parts fluoropolymers. Thus, a composition containing TRB H (polybutylene terephthalate) 100, 3,9-bis(2-phenylethyl)-2,4,8,0-tetraoxa-3,9-diphosphaspiro(5.5)undecane-3,9-dioxide 15, and CaCO 5 parts was injection-molded to give a test piece showing UL-94 rating V-0 (thickness 1.6 mm).

E2284-92-94, 3,9-Bis(2-phenylethyl)-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5.5)undecane-3,9-dioxide
RL; IMF (Industrial manufacture); MOA (Modifier or additive use), TEM (Technical or engineered material use); FREP (Preparation); USES (Uses)

(Tieproofing agent; preparation of P-containing fireproofing agents for atic

tice
polyester moldings with good hydrolysis resistance)
62284-92-8 CAPUUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(2-phenylethyl), 3,9-dioxide (9CI) (CA INDEX NAME)

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Japanese

PATENT NO. JP 2004051818 JP 2002-212259 MARPAT 140:182440

KIND DATE 0040219

20020722

APPLICATION NO. JP 2002-212259

DATE

20020722

— 0 0 V— CH2 — R2

The compns. comprise (a) 100 parts polymers containing 260% aromatic polyesters, (b) 1-100 parts organic P compds. I [R1, R2 = (substituted) Ph, naphthyl, anthryl], (c) 0.1-100 parts alkali metal salts and/or alkaline eametal salts, (d) 0-50 parts fire resistance:improving polymers, (e) 0-200 parts [illers, and optionally (f) 0.01-10 parts fluoropolymers. Thus, a composition containing TRB H (polybutylene terephthalate) 100, 3,9-dibensyl-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5.5)undecane-1,9-dioxide 15, and CaCOJ parts was injection-molded to give a test piece showing UL-94 rating V-0 (thickness 1.6 mm).

thickness 1.6 mm).
20544-37-0P, 3,9-Dibenzyl-2,4,8,10-tetraoxa-3,9diphosphaspiro[5,5]underane 3,9-dioxide
RL: IMF (Industrial manufacture); MOA (Modifier or additive use); TEM
(Technical or engineered material use); PREF (Freparation); USES

(fireproofing agent; preparation of P-containing fireproofing agents for aromatic

polyester moldings with good hydrolysis resistance)
20544-37-0 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-,
3,9-dioxide (CA INDEX NAME)

Results 10/541021

23 of 76

62284-92-8 CAPLUS 2.4.8.10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-,3,9-dioxide (9CI) (CA INDEX NAME)

CH2- CH2- Ph Ph- CH2 - CH2

AN 2004:117724 CAPLUS Full-text

140:181621
Preparation of colorless and high-purity pentaerythritol spirocyclic bis(phosphonate)s
Ando, Shinichi; Yamanaka, Katsuhiro; Tanabe, Seiichi; Taketani, Yutaka Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 13 pp.
CODEN: JKXXAF
Patent
Japanese
CNT 1
PATENT NO, KIND DATE APPLICATION NO, DATE

The title bis(phosphonate)s I (Ar2, Ar3 = C6-20 aryl; R3-R6 = H, C6-20 aryl; C1-20 hydrocarbyl), useful as fireproofing agents for resins, are prepared by condensation of pentaerythritol (II) with AriCRIRAPION22 (Arl = C6-20 aryl; R1, R2 = H, C6-20 aryl; C1-20 hydrocarbyl; X = C1, Br, iodide) in the presence of organic bases in organic solvents, dissoln. of byproduct H halide-organic base saits in H2O, removal of the aqueous solns, dispersing of the reaction products in aliphatic monohydric alca., and filtration of the dispersions. Thus, II was condensed with PhOtAP(0)C12 in the presence of pyridine in CHC13, water was added, the water phase was removed, the CHC13 phase was vacuum-concentrated, MeOH was added, and the slurry was filtered to give I (Ar2 = Ar3 = Ph, R3-R6 = H) in 994 purity and with a yellowing index 2.87.
25%41-37-0P, 3,9-81s(phenylmethyl)-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5,5)undecane=3,9-dioxide 475101-76-9F, 3,9-diophonylmethyl)-3,9-dioxo-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5,5)undecane

AM ANSHER 10 TOP 62 MCAPLUS TOPYRIGHT 2007 ACS ORESTN AN 2004:117725 CAPLUS Full-Lext DN 140:181622

140:181622 Preparation of colorless and high-purity pentaerythritol spirocyclic

bis(phosphonace)s and high-purity pentaety. Into spirocyclic bis(phosphonace)s Ando, Shinichi; Yamanaka, Katsuhiro; Tanabe, Selichi; Taketani, Yutaka Teljin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho. 12 pp. CODEM: JKXXAF

so

DT LA

DT Patent LA Japanese FAN, CNT 1 PATENT NO. KIND DATE APPLICATION NO. DATE 0040212 20020#049 T 140:181622 PI JP 2004043312 A
PRAI JP 2002-195719
OS CASREACT 140:181622; MARPAT JP 2002-195719

$$Ar^2 = \begin{matrix} R^5 & R^7 & O & O \\ \vdots & \vdots & \ddots & O \\ k^6 & k^8 & 0 \end{matrix} O & \begin{matrix} O & R^9 & R^{11} \\ O & \vdots & \vdots \\ k^{10} & k^{12} \end{matrix}$$

The title bis(phosphonate)s I (Ar2, Ar3 = C6-20 aryl; R5-R12 = H, C6-20 aryl, C7-30 aralkyl, C1-20 hydrocarbyl), useful as fireproofing agents for resins, are prepared by condensation of pentaerythritol (II) with ArICRIRZCT3RAP(0)X2 (Ar1 = C6-20 aryl, R-R4 = H, C6-20 aryl, C7-30 aralkyl, C1-20 hydrocarbyl; X = C1, Br, iodide) in the presence of organic bases in organic solvents, dissoln. of byproduct H halide-organic base salts in H2O, removal of the aqueous solms, dispersing of the reaction products in aliphatic monohydric alcs., and filtration of the dispersions. Thus, II was substituted with PhCH2CH2P(O)C12 in the presence of pyridine in CHC13, water was added, the water phase was removed, the CHC13 phase was vacuum-concentrated, McOH was added, and the slurry was filtered to give I (Ar2 = Ar3 = Ph, R5-R12 = H) in 991 purity and having a yellowing index 1.54. 62384-378-87, 3,9-Bid:2-phenylethyl-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5,5)undecane-3,9-dioxide

Results 10/541021

24 of 76

RL: IMP (Industrial manufacture); SPN (Synthetic preparation); PREF

RE: IMF (Industrial manufacture); SPN (synthetic preparation); PREP tireparation) (preparation of pentaerythritol spirocyclic bis(phosphonate)s as fireproofing agents for resins by condensation of pentaerythritol with phosphonyl dihalides) 20544-37-0 CAPLUS 2.4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

475101-76-9 CAPLUS
2.4.8.10-Tetraoxa-3.9-diphosphaspiro[5.5]undecane, 3.9-bis(diphenylmethyl)
3.9-dioxide (9C1) (CA INDEX NAME)

ANSMER:20.00 62 CAPLUS CONVRIGHT 2007 ACS ON STN

140:147311

140:147311
Pentaerythricol spirocyclic diphosphonate fireproofing agenta, and their polyphenylene ether compositions and moldings with good heat resistance Yamanaka, Katsuhiro, Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 21 pp. CODEN: JAXXAF
Patent
Japanese
CNT 1

DT LA

PATENT NO DATE APPLICATION NO. DATE PI JP 2004035797
PRAI JP 2002-196779
OS MARPAT 140:147311
GI JP 2002-196779 20020705

- The tireproofing agents are I (R1, R4 H, C1-5 aliphatic hydrocarbyl, Ph, naphthyl, anthryl; R2-R6 Ph, naphthyl, anthryl). The compns. contain 100 parts blends of 60-100 parts polyphenylene ethers and 0-40 parts styrene polymers, and 1-100 parts J. Thus, an injection modifing comprising Zylon (polyphenylene ether) 90, Styron H 9152 (impact-resistant styrene polymer) 10, and I (R1 R4 H, R2-R6 Ph) showed fire resistance (UL 94 test) V-0 and deflection temperature under load 177*
 47-10-14-49, 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-3,9-dioxide
 RL: IMF (Industrial manufacture); MOA (Modifier or additive use); PREF (Treporationi; USES (USES)

 (manufacture of pentaerythritol spirocyclic diphosphonate fireproofing agents with no adverse effect on heat resistance of polyphenylene ether compns. and moldings)
 47510-1-6-9 CAPLUS
 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-3,9-dioxide (9C1) (CA INDEX NAME)

ADISHER 20 09 62 CAPUS COPYRIGHT 2009 Mc5 OD STAP 2004:97705 CAPLUS Full-text 140:147310

140:147310

Pentaerythritol spirocyclic diphosphonate fireproofing agents, and their polyphenylene ether compositions and moldings with good heat resistance Yamanaka, Katsuhiro, Taketani, Yutaka Teijin Chemicals Ltd.. Japan Jpn. Kokai Tokkyo Koho. 22 pp. CODEN: JKXXAF NQ TI

PA SO

Patent

Japanese

PATENT NO. KIND DATE APPLICATION NO. DATE 20040205 JP 2004035796 JP 2002-196778 20020705 PRAI JP 2002-196778 OS MARPAT 140:147310

Results 10/541021

27 of 76

The fireproofing agents are I (R1, R2 = Ph, naphthyl, anthryl) and have acid value of \$0.7 mgKOH/g. The compns. contain 100 parts blends of \$60-100 parts polyphenylene ethers and 0-40 parts styrene polymers, and 1-100 parts I. Thus. an injection molding comprising Zylon (polyphenylene ether) 90, Styron H 9152 (impact-resistant styrene polymer) 10, and I (R1 = R2 - Ph) 5 parts showed fire resistance (UL 94 test) V-0 and deflection temperature under load

20544-27-0P

RL: IMF (Industrial manufacture); MOA (Modifier or additive use);

RE: IMF (Industrial manufacture), MOA (Modifier or additive use),
PREP [Preparation], USES (Uses)
 (manufacture of pentaerythritol spirocyclic diphosphonate fireproofing
 agents with no adverse effect on heat resistance of polyphenylene ether
 compns. and moldings)
20544-37-0 CAPLUS
2.4.8,10-Tetraoxa-3.9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-,
3.9-dioxide (CA INDEX NAME)

ANSTER 20 OF 62 CAPEUS COPYRIGHT 2007 ACS ON STA

2004:97543 CAPLUS Full-text 140:164019

140:164019
Preparation of pentaerythritol spirocyclic bis(phosphonate)s without drying of the bis(hydrophosphonate) intermediate and isolation of the alkali salt intermediates and isolation of the Ando. Shinichi; Inamura, Koichi; Tanabe, Seiichi; Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 18 pp. CODEN: JKXXAF Patent
Japanese
Japanese
LONT 1
PATENT NO. KIND DATE APPLICATION NO. DATE

KIND ----PATENT NO. KIND DATE

JP 2004035481 A 200205

JP 2002-195717 20020704

CASREACT 140:164019; MARPAT 140:164019 JP 2002-195717

The title bis(phosphonate)s I (Y - CR8R9CR6R7AT2; Z - CR10R11CR12R13AT3; AT2, AT3 - C6-20 aryl; R6-R13 - H, C6-20 aryl; C7-30 aralkyl; C1-20 hydrocarbyl), useful as fireproofing agents for resins, are prepared by treatment of pentaerythritol with PCl3 under an inert atmospheric, oxidation of the

Results 10/541021

26 of 76

The fireproofing agents are I (Ar1-Ar4 = Ph, naphthyl, anthryl, R1-R4 = H, C1-S allphatic hydrocarbyl, Ph, naphthyl, anthryl, All, AL2 = C1-S allphatic hydrocarbyl, Ar3 and Ar4 may bond to C atom of AL1 and AL2, resp., p, q = 0-3) hydrocarbyl, Ar3 and Ar4 may bond to C atom of AL1 and AL2, resp.; p, q = 0-3) and have acid value of \$0.7 mgKOH/g. The compns. contain 100 parts blends of 60-100 parts polyphenylene ethers and 0-40 parts styrene polymers, and 1-100 parts I. Thus, an injection molding comprising Zylon (polyphenylene ether) 90, Styron H 9152 (impact-resistant styrene polymer) 10, and I (R1-R4 = H, Ar1 = Ar2 = Ph, AL1 = AL2 = CH2, p = q = 0) 5 parts showed fire resistance (UL 94 test) V-0 and deflection temperature under load 175*.

42281-92-8P

RL: IMP (Industrial manufacture); MOA (Modifier or additive use); PRRE (Preparation); USES (Uses)

(manufacture of pentaerythricol spirocyclic diphosphonate fireproofing agents with no adverse effect on heat resistance of polyphenylene ether compns. and moldings)

2.244-92-8 CAPLUS

2.44,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

ANSHER 22-05 62 CAPLUS COBURIGHT 2000 ACSTON 2011 2004: 97704 CAPLUS FULL CORE

140:147309
Pentaerythritol spirocyclic diphosphonate fireproofing agents, and their polyphenylene ether compositions and moldings with good heat resistance Yamanaka, Katsuhiro, Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 21 pp. CODEN: JKXXAF
Patent

DT Patent LA Japanese FAN.CNT 1

PATENT NO. KIND DATE APPLICATION NO. DATE 0440205 20020705 JP 2004035794 JP 2002-196776 MARPAT 140:147309 JP 2002-196776 20020705

28 of 76

lis tU/541021 28 of 76
resulting bis(chlorophosphite) II with proton sources, filtration of the resulting bis(chlorophosphonate) I (Y, Z = H) under an inert atmospheric, treatment of the solvent-wetted bis(hydrophosphonate) with R10M (R1 = C1-20 alkyl; M = alkali metal) in organic solvents under an inert atmospheric, and substitution of the resulting alkali metal salt I (Y, Z = alkali metal) solns, with ArICK2RS/RARSX (Ar1 = C6-20 aryl; R2-R5 = H, C6-20 aryl; C7-30 aralkyl, C1-20 hydrocarbyl, X = C1, Br, iodide). Thus, II was oxidized with tert-BuOH, filtered under a N atmospheric, treated with NaOMe in DMP under a N atmospheric, and then substituted with Ph(CH2)2Br to give I (Y = Z = (CH2)2Ph) in 99 purity.

6.2264-V9.-R9, 3, 9-Bis(2-phenylethyl)-3,9-dioxo-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5.5)undecane
RL: IMP (Industrial manufacture), SPN (Synthetic preparation), PPEP (PPEParation)

(Preparation) (preparation of pentaerythritol spirocyclic bis(phosphonate)s without

of the bis(hydrophosphonate) intermediate and isolation of alkali salt

or the Disinyarophosphonate) intermediate and isolation of alkali salt intermediates) 62284-92-8 CAPUS 2.4,8,10-7etracoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phonylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

L11 ANSHER 24 OF 62 CAPLUS COPYRIGHT 2007 ACS ON STN

7 2004:97-54 CAPLOS FULLENT
DN 140:164018
TI Preparation of pentaerythritol spirocyclic bis(phosphonate)s without drying of the bis(hydrophosphonate) intermediate and isolation of alkali salt intermediates
IN Ando, Shinichi; Tando, Kazushi; Tanabe, Seiichi; Taketani, Yutaka
Ando, Shinichi; Tando, Kazushi; Tanabe, Seiichi; Taketani, Yutaka
To Ipn. Kokai Tokkyo Koho, 19 pp.
CODEN: JAXXAF
DT Patent
LA Japanese
FAN.CNT 1
PATENT NO. KIND DATE APPLICATION NO. DATE

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2004035480	A	20040205	JP 2002-195716	20020704
PRAI	JP 2002-195716		20020704		
os	MARPAT 140:164018		•		
GI					

- The title bis(phosphonate)s I (Y = CR4R5Ar2; Z = CR6R7Ar3; Ar2, Ar3 = C6-20 aryl, R4-R7 = H, C6-20 aryl, C1-20 hydrocarbyl), useful as fireproofing agents for resins, are prepared by treatment of pentaerythritol with PCl3 in inert an atmospheric, oxidation of the resulting bis(hydrophosphonate) I (Y, Z = H) in an inert amospheric, treatment of the undried solvent-containing bis(hydrophosphonate) with R10M (R1 = C1-20 alkyl, M = alkali metal) in organic solvents under an inert atmospheric, and substitution of the resulting bis(hydrophosphonate) with R10M (R1 = C1-20 alkyl, M = alkali metal) in organic solvents under an inert atmospheric, and substitution of the resulting alkali metal salt I (Y, Z = alkali metal) soins, with Ar1CR2R3X (Ar1 = C6-20 aryl; R2, R3 = H, C6-20 aryl, C1-20 hydrocarbyl; X = Cl, Br, iodide). Thus alkali metal by the tert-Bu0H, filtered under a N atmospheric, then treated with NaOMe in DMF under a N atmospheric, and then substituted with PhCH2Br to give I (Y = Z = CH2PH) in 99 purity.

 20544-37-0P, 3,9-Dlbenzyl-3,9-dioxo-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5,5] undecame
 Alt: IMF (Industrial manufacture); SPN (Synthetic preparation); PREF (Esparation) (preparation of pentaerythritol spirocyclic bis(phosphonate)s without ng

of bis(hydrophosphonate) intermediate and isolation of alkali salt

intermediates)
20544-37-0 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-,
3,9-dioxide (CA INDEX NAME)

475101-74-7 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethy1)-, 3,9-dioxide (9CI) (CA INDEX NAME)

2004:97539 CAPLUS CHARLEMAN.
140:164017
Preparation of high-purity pentaerythritol spirocyclic
bis(hydrophosphonate) from the corresponding bis(chlorophosphite)
Tando, Kazushi; Ando, Shinichi; Imamura, Koichi; Tanabe, Seiichi;
Tantani, Viraka

Taketani, Yutaka Teijin Chemicals Ltd., Japan

Resu	lts 10/541021		31
	PATENT NO.	KIND	DA:
PI	JP 2004035470	A	
PRAI	JP 2002-194718		200
OS	MARPAT 140:146984		

of 76

APPLICATION NO. DATE JP 2002-194718

GI

- The diphosphonates I (Y = CCR3R4R1R2Ar1; Z = CR5R6CR7R8Ar2; Ar1, Ar2 = C6-20 aryl, Rl-R8 = H, C6-20 aryl, C7-30 aralkyl, C1-20 hydrocarbyl), useful as fireproofing agents for resins, are manufactured by substitution of I (Y, Z = alkali metals) with Ar3CR9R10CR11R12X (Ar3 = C6-20 aryl, R9-R12 = H, C6-20 aryl, C7-30 aralkyl, C1-20 hydrocarbyl; X = C1, Br, iodidel). Thus, 0.80 mol I (Y = Z = Na) was substituted with 1.60 mol PhCH2CH2Br, filtered, and purified with H2O and MeOH to give I (Y = Z = CH2CH2Ph) with purity 99% and content of residual volatile substance 400 ppm. Pellets comprising 100 parts Suntac UT 61 (ABS) and 15 parts I (Y = Z = CH2CH2Ph) were injection-molded to give a test piece showing fire resistance (UL 94) V-2 and good appearance. No deposition was observed in the injection mold after molding 500 times.

ASSERTING AND AND ASSERTING AND ASSERTING AND ASSERTING AND ASSERTING ASSERT

62284-92-8 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(2-phenylethy1)-, 3,9-dioxide (9CI) (CA INDEX NAME)

OF 62 CARLUST CORVEIGHT 2007 ACS ON STN
CAPLUS Full-text

- DN TI 140:146:983
 Manufacture of low-volatile pentaerythritol spirocyclic diphosphonates as fireproofing agents for resins
 Ando, Shinichi; Imamura, Koichi; Tando, Kazushi; Tanabe, Seiichi;
- IN
- Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 19 pp. CODEN: JKXXAF
- Patent
- LA Japanese FAN.CNT 1

Results 10/541021 30 of 76

80 Jpn. Kokai Tokkyo Koho, 9 pp. CODEN: JKXXAF

Patent

LA Japanese FAN.CNT 1 PATENT NO.

KIND DATE APPLICATION NO.

20020703 PI JP 2004035472 PRAI JP 2002-194720 JP 2002-194720

CASREACT 140:164017

0', b', c1-b', 0

The title bis(hydrophosphonate) I is prepared by oxidation of II with proton sources from -20° to 80° in solvents having water content of \$1000 ppm. The bis(hydrophosphonate) I may be filtered in an inert atmospheric and recovered as a solid wetted with the solvents without subsequent drying. Thus, II was oxidized with tert-BuOH at 5° in CN2Cl2 (H2O content 3 ppm) and filtered in a N atmospheric to give CH2Cl2-wetted I with selectivity 90%, vs. selectivity 82% when CH2Cl2 containing 10.000 ppm H2O was used.

6228-42-93-95

81. SPN (Synthetic preparation), PRPD (Preparation)

DATE

20020703

62284-93-9F
RL: SPN (Synthetic preparation), PREP (Preparation)
(preparation of high-purity penteerythritol spirocyclic
bis(hydrophosphonate) by oxidation of the corresponding
bis(chlorophosphice) in water-free solvents)
62284-92-8 CAPLUS
2,4,8,10-Tetracaxa-3,9-diphosphaspiro(5,5)undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

AN 2004:97537 CAPLUS COPYRIGHT 2003 ACS ON STN DN 140:146984

140:146984
Manufacture of low-volatile pentaerythritol spirocyclic diphosphonates as fireproofing agents for resins
Ando, Shinichi; Tando, Kazushi; Imamura, Koichi; Tanabe, Seiichi; Taketani, Yutaka
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 15 pp.
CODEN: JKXXAF
Patent

DT Patent LA Japanese FAN.CNT 1

Results 10/541021 32 of 76 PATENT NO. DATE APPLICATION NO. DATE PI JP 2004035469 PRAI JP 2002-194717 OS MARPAT 140:146983 GI 00 0205 JP 2002-194717 20020703

The diphosphonates I (Y = CR1R2Ar1; Z = CR3R4Ar2; Ar1, Ar2 = C6-20 aryl; R1-R4 = H, C6-20 aryl, C1-20 hydrocarbyl) are manufactured by substitution of I (Y, Z = alkali metals) with Ar3CRSR6X (Ar3 = C6-20 aryl; R5, R6 = H, C6-20 aryl, C1-20 hydrocarbyl; X = C1, Br, iodide). Thus, 0.80 mol I (Y = Z = Na) was substituted with 1.60 mol PhCM2Br, filtered, and purified with H2O and MeOH to give I (Y = Z = CM2Ph) with purity 99% and content of residual volatile substance 350 ppm. Pellets comprising 100 parts Suntac UT 51 (ABS) and 15 parts I (Y = Z = CM2Ph) were injection-molded to give a test piece showing fire resistance (UL 94) V-2 and good appearance. No deposition was observed in the injection mold after molding 500 times.

Z014.41-27 97 4/2016 1/4 7P
RL: IMF (Industrial manufacture); MOA (Modifier or additive use); PUR (Purification or recovery); PRCF (Intigrations; USES (Uses) (manufacture of low-volatile pentaerythritol spirocyclic diphosphonates as fireproofing agents for resins from their corresponding alkali metal salts)

20544-37-0 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, J,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

475101-74-7 CAPLUS 2.4.8,10-Tetraox-3.9-diphosphaspiro[5.5]undecane, 3.9-bis(1-phenylethyl)-, 3.9-dioxide (9CI) (CA INDEX NAME)

20020705

PI JP 2004035795 PRAI JP 2002-196777

MARPAT 140:147273

The fireproofing agents are I (R1, R4 = H, C1-5 aliphatic hydrocarbyl), R2, R5 = Ph, naphthyl, anthryl; R1, R6 = C1-5 aliphatic hydrocarbyl). The compns. contain 100 parts blends of 60-100 parts polyphenylene ethers and 0-40 parts styrene polymers, and 1-100 parts I. Thus, an injection molding comprising Zylon (polyphenylene ether) 90, Styron H 9152 (impact-resistant styrene polymer) 10, and I (R1 = R4 = H, R2 = R5 = Ph, R3 = R6 = Mel showed fire resistance (UL 94 test) V-0 and deflection temperature under load 172*.

475101-74-7P
RL: IMF (Industrial manufacture); MOA (Modifier or additive use);
PREP (Preparation); USES (Uses)
(manufacture of pentaerythritol spirocyclic diphosphonate fireproofing agents with no adverse effect on heat resistance of polyphenylene ether compns. and moldings)
47.48,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)



Results 10/541021 35 of 76 compositions containing organophosphorus compounds, and their moldings Yamanaka, Katsuhiro; Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 34 pp CODEN: JKXXAF Patent Japanese FAN. CNT 1 PATENT NO. KIND DATE APPLICATION NO. DATE 2040122 P1 JP 2004018733 PRAI JP 2002-177296 JP 2002-177296 20020618 MARPAT 140:112503

Title compns. contain 100 parts polymers containing ≥60% ABS and 1-100 parts organophosphorus compds. I [Ar]-Ar4 = (un) substituted Ph. naphthyl, anthryl; RN-R4 = H, Cl-5 aliphatic hydrocarbyl, (un) substituted Ph. naphthyl, anthryl; All, AL2 = Cl-5 linear or branched aliphatic hydrocarbyl; p, q = 0-3]. Thus, a molding comprising 100 parts Santac UT 61 (ABS resin) and 15 parts 2,4.8.10-tetraoxa-3,9-diphosphaspiro[5,5] bundecane-3,9-di(2-phenylethyl)-3,9-dioxide showed UL-94 flammability rating V-2, heat distortion temperature retention 95%, and no burn marks.

showed UL-94 (lammability rating V-2, heat distortion temperature retention 964, and no burn marks.

12.9, 42, 59
Rt: IMF (Industrial manutacture), MOA (Modifier or additive use), PREP (Properties); TEM (Technical or engineered material use); PREP (PREP CANAGE) (PREP CANAGE); PREP (PREP CANAGE);

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

CH2-CH2-Ph Ph - CH2 - CH2

ANSHER 11 05 62 CABLUS CODVRIGHT 2000 ACS TON STN. 2004:57551 CAPLUS MILITURE 140:112220

Halogen-free styrene polymer compositions with good flowability and heat and fire resistance, and their moldings

34 of 76 Results 10/541021 2004:57592 CAPLUS Full-text DN TI 140:112223 Flame retardant thermoplastic polycarbonate resin compositions and molded articles articles
Yamanaka, Katsuhiro; Taketani, Yutaka
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 42 pp.
CODEN: JXXXAF
Patent
Japanese
LCNT 1
PATENT NO. KIND DATE TN DT APPLICATION NO DATE PI JP 2004018767 PRAI JP 2002-178370 OS MARPAT 140:112223 20020619

The compns., having good heat resistance and processability, comprise 10 The compnis., having good heat resistance and processability, comprise 100 parts thermoplastic resists containing \$500 polycarbonates and 1-100 parts I [R1, R4 = H, C1-5 aliphatic hydrocarbyl, (un)substituted Ph. naphthyl, anthryl; R2, R3, R5, R6 = (un)substituted Ph, naphthyl, anthryl; having an acid value of \$0.7 mg KOH/g and a purity of \$904. Thus, a test piece prepared from polycarbonate (Panlite L 1225WP) 100, 3,9-bis(diphenylmethyl)-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5,5]undecana 3,9-dioxide [II) (acid value 0.3 mg KOH/g, purity 994) 5, and PTFE (Polyflon MPA-FA 500) 0.2 part showed UL-94 flammability rating V-0, vs. V-1, for a test piece containing II with acid value 1.9 mg KOH/g.
475101-76-99
RL; IMP (Industrial manufacture); MOA (Modifier or additive use);

475101-02-99
REL IMP (Industrial manufacture); MOA (Modifier or additive use);
PREP (Preparation); USES (Uses)
(halogen-free fireproofing agents for thermoplastic polycarbonate resin compns.)
475101-76-9 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphonylmethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

CAPLUS Full-text

140:112503 Halogen-free heat- and fire-resistant transparent ABS resin-based

Results 10/541021 36 of 76 Yamanaka, Katsuhiro, Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 19 pp. CODEN: JKXXAP \$0 DT Patent Japanese DATE 20040122 PATENT NO. KIND APPLICATION NO. DATE PI JP 2004018626 PRAI JP 2002-173995 JP 2002-173995 20020614 20020614 MARPAT 140:112220

The compons. comprise (A) styrene polymers 100. (B) polyphenylene ethers 1-100, and (C) organic P compda. I (R1, R4 = H, C1-5-aliphatic hydrocarbon group; R3, R6 = C1-5-aliphatic hydrocarbon group; R3, R5 = Ph, naphthyl, anthryl) 1-100 parts. Thus, a composition comprising 2,4,8,10-tetraoxa-3,9-diphosphaspiro[5,5]undecane, 3,9-bis(a-methylbenzyl)-3,9-dioxide, a high-impact polyatyrene (Styron H 9152), and polyphenylene ether (Zylon) was injection-molded to give a test piece showing limiting 0 index (L01) 25.2*, heat distortion temperature 92°, flowability (MVR) 13.7 cm/10 min, and UL 94 fire resistance rating V0.

475101-77-79, 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5,5]undecane, 3,9-bis(1-phenylethyl)-, 3,9-dioxide
R1. IMF (Industrial manufacture); MOA (Modifier or additive use); TEM (Technical or engineered material use); PREP 'Preparation'; USES (Uses)

(Wees)

(Gireproofing agent, pentaerythritol diphosphonate fireproofing agents for styrene polymer compns. with good flowability and heat resistance)
475101-74-7 CAPUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5]undecane, 3,9-bis(1-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)



Results 10/541021 37 of 76 140:112485 Halogen-free heat- and fire-resistant transparent ABS resin-based Compositions containing organophosphorus compounds, and their moldings Yamanaka, Katsuhiro, Taketani, Yutaka Teijin Chemicals Ltd., Japan . Kokai Tokkyo Koho, 33 pp. CODEN: JKXXAF DT Patent LA Japanese FAN.CNT 1 PATENT NO APPLICATION NO. KIND DATE DATE JP 2004018734 JP 2002:177297 MARPAT 140:112485 20020518 JP 2002-177297 20020618

Title compns. contain 100 parts polymers containing 260% ABS and 1-100 parts organophosphorus compds. I [R1, R4 = H, C1-5 aliphatic hydrocarby], (un) substituted Ph, naphthyl, anthryl; R2, R3, R5, R6 = (un) substituted Ph, naphthyl, anthryl; R2, R3, R5, R6 = (un) substituted Ph, naphthyl, anthryl]. Thus, a molding comprising 100 parts Santac UT 61 (ABS resin) and 15 parts 2,4,8,10-tetraoxa-3,9-diphosphaspiro[5,5]undecane-3,9-bis(dipheny)methyl)-3,9-dioxide showed UL-94 flammability rating V-2, heat distortion temperature retention 98%, and no burn marks.
475:10-176-92, 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5,5]undecane-3,9-bis(dipheny)methyl)-3,9-dioxide
RL: INF (Industrial manufacture); MOA (Modifier or additive use); PRPP (Propertices); TEM (Technical or engineered material use); PRPP (Froparation); USES (Uses) (heat-and fire-resistant transparent ABS resin-based compns. containing tetraoxadiphosphaspiroundecanes)
475:10-1-69 (APLUS)
475:10-1-69 (APLUS)
475:10-1-69 (APLUS)

Halogen-free styrene polymer compositions with good flowability and heat and fire resistance, and their moldings

Results 10/541021 39 of 76 Preparation of high-purity pentaerythritol spirocyclic bis(phosphonate)s as ifreproofing agents for resins
Imamura, Koichi; Tanabbe, Seilchi; Ando, Shinichi; Taketani, Yutaka
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 14 pp.
CODEN: JXXXAF
Patent Japanese FAN CNT 1 PATENT NO. KIND DATE APPLICATION NO. DATE Α... 20040122 JP 2004018387 JP 2002-171213 20020612

PRAI JP 2002-171213 20020612 CASREACT 140:111527; MARPAT 140:111527

The title bis(phosphonate)s I (Ar1, Ar2 = C6-20 aryl; R1-R8 = H, C6-20 aryl; C1-20 hydrocarbyl) are prepared by heating II (Ar1, Ar2, R1-R8 = same as above) having purity 295% in the presence of halogenated compds. at 120-250°. Thus, II (R1-R8 = H, Ar1 = Ar2 = Ph; purity 99%) was heated in the presence of Ph(CR2)2BF at 180° to give I (R1-R8, Ar1, Ar2 = same as above) showing purity 99% with selectivity 92%. C10R4 (97-80, 3).9-Bis(2-phenylethyl) 2,4.8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PRET (Freparation)

aparaction
(preparation of high-purity pentaerythritol spirocyclic bis(phosphonate)s

fireproofing agents for resins by heating corresponding diphosphites with halogen compds.)
62284-92-8 CAPLUS
2.4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

Results 10/541021 38 of 76 Yamanaka, Katsuhiro; Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 20 pp. CODEN: JKXXAF DT Patent LA Japanese PAN.CNT 1 DT LA APPLICATION NO. PATENT NO. KIND DATE DATE PI JP 2004018627 PRAI JP 2002-173996 OS MARPAT 140:129119 GI 20020614 JP 2002-173996 20020614

$$Ar^{1} = \begin{cases} \begin{pmatrix} Ar^{3} \end{pmatrix}_{p} & & & \\ & Q & & \\ & & \\ & & \\$$

The compns. comprise (A) styrene polymers 100, (B) polyphenylene ethers 1-100, and (C) organic P compds. I (Ar1-4 * Pn, naphthyl, anthryl; R1-4 * H, C1-5-aliphatic hydrocarbon group; Pn, naphthyl, anthryl; All, Al2 * C1-5-aliphatic hydrocarbon group; p, q = 0-3; Ar3 and Ar4 may link to atoms in All and Al2) 1-100 parts. Thus, a composition comprising 2.4,8,10-tetraoxa-3,9-diphosphaspiro[5.5] undecane, 3,9-bis(2-phenylethyl) - 3,9-dioxide, a high-impact polystyrene (Styron H 9152), and polyphenylene ether (Zylon) was injection-molded to give a test piece showing limiting 0 index (LOI) 22.3%, heat distortion temperature 83°, flowability (MVR) 12.6 cm3/10 min, and UL 94 fire resistance rating V0.
51261-92-9P, 2.4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide
RE: IMP (Industrial manufacture); MOA (Modifier or additive use); TEM (Technical or engineered material use); PEEF (Preparation); USES (Uses)

(Greproofing agent; pentaerythritol diphosphonate fireproofing agents for styrene polymer compns. with good flowability and heat resistance) 62284-92-5 CAPLUS 2.4.8.10-Tetraoxa-3.9-diphosphaspiro[5.5]undecane, 3.9-bis(2-phenylethyl)-, 3.9-dioxide (9CI) (CA INDEX NAME)

Results 10/641021 LI JUSTIER OF GP CAPLUS COPYRIGHT 2007 ACS ON ACS ON ACS ON ACS OF A COPYRIGHT 2007 ACS OF A COPYRIGHT 140:112216
Pentaerythritol spirocyclic diphosphonates as fireproofing agents with no DN TI

Nalogen gas generation in kneading with resins
Taketani, Yutaka, Yamanaka, Katsuhiro; Imamura, Kolchi, Tanabe, Selichi
Teljin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 13 pp.
CODEN: JKXXAF

PA SO

40 of 76

DT Patent Japanese

LA Japa. FAN.CNT 1 PATENT NO. KIND DATE APPLICATION NO. DATE 20040122 JP 2004018383 JP 2002-171209 20020612 PRAI JP 2002-171209 OS MARPAT 140:112 GI MARPAT 140:112216

The diphosphonates I (Ar1, Ar2 = C6-20 aryl, R1-R8 = H, C6-20 aryl, C7-30 aralkyl, C1-20 hydrocarbyl) have content of total residual halogen of \$3000AB ppm and ionic halogen of \$1000 ppm. Thus, pellets comprising 100 parts Suntac UT 61 (ABS) and 15 parts 1 (Ar1 = Ar2 = Ph, R1-R8 = H; total residual halogen 120 ppm, ionic halogen 41 ppm) were injection-molded to give a test piece showing fire resistance (UL 94) V-2 and good appearance. No deposition was observed in the injection mold after molding 500 times.

62284-92-8F RL: IMF (Industrial manufacture); MOA (Modifier or additive use);

PLEI (FriepAration): USES (Uses)

(pentaerythritol spirocyclic diphosphonates as (ireproofing agents with no halogen gas generation in kneading with resins)

62284-92-8 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

CH2- CH2- Ph



2004;55598 CAPUMS—Puritings.
140:112215
Pentaerythritol spirocyclic diphosphonates as fireproofing agents with no

halogen gas generation in kneading with resins
IN Taketani, Yutaka; Yamanaka, Katsuhiro; Imamura, Koichi; Tanabe, Seiichi
PA Teijin Chemicals Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 16 pp.
CODEN: JXXXAF
DT Patent
LA Japanese
FAM.CNT 1
PATENT NO.

A DATE A 0040122 20020612 PATENT NO. PI JP 2004018382 PRA1 JP 2002-171208 OS MARPAT 140:112215 GI

APPLICATION NO. DATE 20020612

$$Ar^{1} = \begin{pmatrix} R^{1} & 0 & 0 & 0 & R^{3} \\ R^{2} & P & 0 & 0 & \frac{R^{3}}{R^{4}} & R^{2} \end{pmatrix}$$

The diphosphonates I (Ar1, Ar2 = C6-20 aryl; R1-R4 = H, C6-20 aryl, C1-20 hydrocarbyl) have content of total residual halogen of \$3000 ppm and ionic hydrocarby1) have content of total residual halogen of \$3000 ppm and ionic halogen of \$1000 ppm. Thus, pellets comprising 100 parts Suntac UT 61 (ABS) and 15 parts I (Ar1 - Ar2 - Ph. Ar1-At - H; total residual halogen 100 ppm, ionic halogen 36 ppm) were injection-molded to give a test piece showing fire resistance (UL 94) V-2 and good appearance. No deposition was observed in the injection mold after molding 500 times. No deposition was observed in the injection mold after molding 500 times. No deposition was observed in the injection mold after molding 500 times. No deposition was observed in the injection mold after molding 500 times. No deposition was observed in the injection mold after molding 500 times. No deposition was observed in the injection mold after molding 500 times. No deposition was observed in the injection molding in deposition of the injection of injection of the injection of injection of the injection of injection of

475101-74-7 CAPLUS 2.4.8.10-Tetraoxa-3.9-diphosphaspiro[5.5]undecane, 3.9-bis(1-phenylethyl)-3.9-dioxide (9C1) (CA INDEX NAME)

Results 10/541021

43 of 76

| MS 107-941021 | A3 01 /6 |
| 1225Wp) 100. 3,9-di(2-phenylethyl) 2,4,8,10-tetraoxa-3,9diphosphaspiro[5.5]undecane 3,9-dioxide (II) (acid value 0.03 mg KOH/g, purity 994) 5, and PTPE (Polyflon MPA-PA 500) 0.2 part showed UL-94 flammability rating V-0, vs. V-1, for a test piace containing II with acid value 1.7 mg KOH/g. 62294-VV-2P, 3,9-Bis(2-phenylethyl)-2,4,8,10-tetraoxa-3,9diphosphaspiro[5.5]undecane 3,9-dioxide |
RL: IMP (Industrial manufacture); MOA (Modifier or additive use); |
PEEF (Preparation); USBS (Uses) (halogen-free fireproofing agents for thermoplastic polycarbonate resin compns.)

compns.) 62284-92-8 CAPLUS

2.4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

ANSWERTOS OF SAM CAREUS CONVETCHTEZODA ACSTONASTN

2004:52952 CAPLUS Full-text
140:112209
Flame retardant thermoplastic polycarbonate resin compositions and molded articles
Yamanaka, Katsuhiro; Taketani, Yutaka
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 39 pp.
CODEN; JKXXAF

Patent Japanese

LA Jap... FAN.CNT 1 PATENT NO. KIND DATE 0040122 20020619 Α JP 2004018765 JP 2002-178368 MARPAT 140:112209 PRAI JP OS MA G1

APPLICATION NO. DATE JP 2002-178368 20020619

The compns., having good heat resistance and processability, comprise 100 parts thermoplastic resins containing 2506 polycarbonates and 1-100 parts I [R1, R4 = H, C1-5 aliphatic hydrocarbyl, R3, R6 = (1-5 aliphatic hydrocarbyl, R2, R5 = (un)substituted Ph, naphthyl, anthryl) having an acid value of \$0.7 mg KOH/g and a purity of ≥90%. Thus, a test piece prepared from polycarbonate Results 10/541021

42 of 76

475101-76-9 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(diphonylmethyl)-, 3,9-dioxide (9C1) (CA INDEX NAME)

ANEMER BD 05 1521 GAPLUS ACCOMMIGHT 2000 FACE OF SINGS AN 2004:52963 CAPLUS Full-text

140:112210

DN TI 140:112210
Flame retardant thermoplastic polycarbonate resin compositions and molded articles
Yamanaka, Katsuhiro; Taketani, Yutaks
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 42 pp.
CODEN; JKXXAF

Patent

Japanese CNT 1

PATENT NO. PI JP 2004018766 PRAI JP 2002-178369

MARPAT 140:112210

KIND

DATE 0040122 20020619

APPLICATION NO. JP 2002-178369

DATE 20020619

The compns., having good heat resistance and processability, comprise 100 parts thermoplastic resins containing 250% polycorbonates and 1-100 parts I [Ar1-Ar4 = (un) substituted Ph, naphthyl, anthryl; L1, L2 = C1-5 aliphatic hydrocarbon group; R1-R4 = H, C1-5 aliphatic hydrocarbon group; R1-R4 = H, C1-5 aliphatic hydrocarbyl. (un) substituted Ph, naphthyl, anthryl; p, q = 0-3] having an acid value of 50.7 mg K0H/g and a purity of $\geq 90\%$. Thus, a test piece prepared from polycarbonate (Panlite L

44 of 76

(Panlite L 1225MP) 100, 3,9-di(u-methylbenzyl)-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide (II) (acid value 0.03 mg KOH/g, purity 99%) 5, and PTFS (Polyflon MPA-PA 500) 0.2 part showed UL-94 flammability rating V-0, vs. V-1, for a test piece containing II with acid value 2.1 mg

KOH/g.
475:01-74-7P, 3,9-Bis(α-methylbenzyl)-2,4,8,10-tetraoxa-3,9diphosphaspiro[5.5]undecane 3,9-dioxide
RL: IMF (Industrial manufacture); MOA (Modifier or additive use);
PREP (Freputation); USES (Uses)
(halogen-free fireproofing agents for thermoplastic polycarbonate resin

compns.)
47-7 CAPLUS
2.4,8.10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

ANSHER SOLOF GE CAPLUS COPYRIGHT 2000 ACS NON-BIN-

KIND

2004:52961 CAPLUS Full-text 140:112208 Flame retardant thermoplastic polycarbonate resin compositions and molded articles

articles Yamanaka, Katsuhiro; Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 41 pp. CODEN: JKXXAF IN PA SO

DT Patent Japanese

FAN. CNT 1

PATENT NO. PI JP 2004018764 PRAI JP 2002-178367 MARPAT 140:112208

DATE 0040122 А 20020619

APPLICATION NO. JP 2002-178367

DATE 20020619

The compns., having good heat resistance and processability, comprise 100 parts thermoplastic resins containing $\geq 50\%$ polycarbonates and 1-100 parts [R1, R2 = (un) substituted Ph, naphthyl, anthryl] having an acid value of ≤0.7

mg KOH/g and a purity of 2904. Thus, a test piece prepared from polycarbonate (Panlite L 1225MP) 100, 3,9-dibenzyl-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide (11) (acid value 0.06 mg KOH/g, purity 99%) 5, and PTFE (Polyflon MPA-PA 500) 0.2 part showed UL-94 (lammability rating V-0, vs. V-1, for a test piece containing II with acid value 2.5 mg KOH/g.
20541-37-09
PREP (Preparation); USES (Uses)
(halogen-free fireproofing agents for thermoplastic polycarbonate resin compns.)

compns.)
20544-37-0 CAPLUS
2.4,8,10-Tetraoxa-3,9-diphosphaspiro{5.5}undecane, 3,9-bis(phenylmethyl)-,
3,9-dioxide (CA INDEX NAME)

CAPLUS Full-text

2004:52945 140:112462

DATE

20040122

140:112462
halogen-free heat- and fire-resistant transparent ABS resin-based compositions containing organophosphorus compounds and their moldings Yamanaka, Katsuhiro; Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 33 pp. CODEN: JKXXAF
Patent

APPLICATION NO.

JP 2002-177295

DATE

20020618

DT LA Patent

Japanese

CNT 1 PATENT NO. KIND PI JP 2004018732 PRAI JP 2002-177295 OS MARPAT 140:112462

Title compns. contain 100 parts polymers containing ≥60% ABS and 1-100 parts organophosphorus compds. I [R1, R4 = H, C1-5 aliphatic hydrocarbyl; R2, R6 = C1-5 aliphatic hydrocarbyl; R2, R5 = (un)substituted Ph, naphthyl, anthryl). Thus, a molding comprising 100 parts Santac UT 61 (ABS resin) and 15 parts 2,4,8,10-tetraoxa-3,9-diphosphaspiro[5,5]undecane-3,9-di- α -methylbenzyl-3,9-di- α -methylbenzyl-3,9-

Results 10/541021

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RL: IMF (Industrial manufacture); MOA (Modifier or additive use); PRP (Properties); TBM (Technical or engineered material use); PREP (Preparation); USES (Uses) (heat- and fire-resistant transparent ABS resin-based compns. containing

tetraoxadiphosphaspiroundecanes)
20544-37-0 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-,
3,9-dioxide (CA INDEX NAME)

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ANSWER NOTICE CASHING CONFIGURE ROOM MASKED STW
2004:5288 CAPLUS Full-text
140:129118
Halogen-free styrene polymer compositions with good flowability and heat
and fire resistance, and their moldings
Yamanaka, Katsubiror, Taketani, Yutaka
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 25 pp.
CODEN, JXXXAF
Patent

Patent

LA Japanese FAN.CNT 1

PATENT NO.

PI JP 2004018628 PRAI JP 2002-173997

KIND 2040122 20020614

DATE

APPLICATION NO. JP 2002-173997

DATE 20020614

MARPAT 140:129118

The compns. comprise (A) 100 parts resins containing 250% styrene polymers and (B) 1-100 parts organic P compds. I (R1, R4 = H, C1-5-aliphatic hydrocarbon group, Ph. naphthyl, anthryl; R2, R3, R5, R6 = Ph. naphthyl, anthryl). Thus, a composition comprising 2.4,8,10-tetraoxa-3,9- diphosphaspiro[5.5]undecame, 3,9-bis(diphenylmethyl)-3,9-dioxide and a high-impact polystyrene (Styron H 9152) was injection-molded to give a test piece showing limiting 0 index (LOI) 21.7%, heat distortion temperature 82°, [lowability (MVR) 32.4 cm3/10 min, and U. 94 fire resistance rating V2.
475101-76-VP, 2,4.8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecame, 3,9-bis(diphenylmethyl)-, 3,9-dioxide
RL: IMF (Industrial manufacture); MOA (Modifier or additive use); TEM

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Results 10/541021

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AGO 76

dioxide showed UL-94 flammability rating V-2, heat distortion temperature retention 95% and no burn marks.
475101 74-79

RL; IMF (Industrial manufacture); MOA (Modifier or additive use); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(heat- and fire-resistant transparent ABS resin-based compns. containing tetraoxadiphosphaspiroundecanes)
475101-74-7 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

ANSIER OF OF 62 CAPIUS COEVERGIFF 2000 ACS OF STU

140:112461

Halogen-free heat- and fire-resistant transparent ABS resin-based

compositions containing organophosphorus compounds and their moldings Yamanaka, Katsuhiro; Taketani, Yutaka Teljin Chemicals Ltd., Japan

so Jpn. Kokai Tokkyo Koho, 33 pp. CODEN: JKXXAP

DТ Patent

LA Japanese FAN.CNT 1

APPLICATION NO. KIND PATENT NO. DATE 0040122 PI JP 2004018731 PRAI JP 2002-177294 OS MARPAT 140:112461 GI JP 2002-177294

Title compns. contain 100 parts polymers containing \geq 60% ABS and 1-100 parts organophosphorus compds. I {R1, R2 = (un)substituted Ph, naphthyl, anthryll with acid value \leq 0.7 mg KOH/g. Thus, a molding comprising 100 parts Santac UT 61 (ABS resin) and 15 parts 2,4,8,10-tetraoxa-3,9-diphosphasplro[5,5]undecane-3,9-dibenzyl-3,9-dioxide showed UL-94 flammability rating V-2, heat distortion temperature retention 98%, and no burn marks. C0541-37-0P

DATE

20020618

Results 10/541021

48 of 76

(Technical or engineered material use); PERF (Preparation); USES

(Gues) (G

ANSWER AR OF 62 CAPRUS COPYRIGHT 2007 ACS ON STN

DN TI

2004-15287 CAPLUS FULL-cax
140:129117
140:129117
Halogen-free styrene polymer compositions with good flowability and fire and heat resistance, and moldings using them
Yamanaka, Katsuhiro; Taketani, Yutaka
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 20 pp.
CODEN: JKXXAF

PA SO

DT

Patent Japanese

FAN. CNT 1

PATENT NO. KIND DATE APPLICATION NO. DATE A 10040122 PI JP 2004018625 PRAI JP 2002-173994 JP 2002-173994 20020614 MARPAT 140:129117

The compns. comprise (A) styrene polymers 100, (B) polyphenylene ethers 1-100, and (C) organic P compds. I (R1, R2 = Ph, naphthyl, anthryl) 1-100 parts. Thus, a composition comprising 2,4,8,10-tetraoxa-3,9-dioxide, a high-impact polystyrene (Styron H 9152), and polyphenylene ether (Zylon) was injection-molided to give a test piece showing limicing O index (LOI) 24.74, heat distortion temperature 89°, flowability (MVR) 12.3 cm3/10 min, and UL 94 fire resistance rating V0.

20544-17-0P, 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyli-, 3,9-dioxide RL: INF (Industrial manufacture); MOA (Modifier or additive use); TEM (Technical or engineered material use); PEEF :Preparation); USES

Results 10/541021

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(Uses)

(fireproofing agent; pentaerythritol diphosphonate fireproofing agents for styrene polymer compns, with good flowability and heat resistance) 20544-37-0 CAPLUS

2.4.8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-,
3.9-dioxide (CA INDEX NAME)

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2004:52867 CAPLUS Full-text

2004;52867 CAPULS Full-text
140:112448
Plame-retardant nonhalogen aromatic polyester compositions and their
moldings
Yamanaka, Katsuhiro; Taketani, Yutaka
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 38 pp.
CODEN: JXXXAF
Patent
Japanese
CMT 1

MARPAT 140:112448

NT 1 PATENT NO. PI JP 2004018586 PRAI JP 2002-172651

KIND Α...

DATE

20040122

APPLICATION NO.

DATE

JP 2002-172651 20020613

The compns. comprise (A) resins containing 260% aromatic polyesters 100, (B) organic P compds. I (R1, R4 = H, C1-5-aliphatic hydrocarbyl, Ph, naphthyl, anthryl; R2, R3, R8, R6 = Ph, naphthyl, anthryl; 1-100, (C) fireproofing resins 0-50, and (D) tillers 0-200 parts. Thus, a 1.6-mm-thick specimen from a composition of 100 parts TRB H (PBT) and 20 parts 2,4.8,10-tetraoxa-3,9-diphosphaspiro(5,5) undecans 3,9-bis(diphenylmethyl)-3,9-dioxide (preparation described) showed UL 94 fire resistance rating V0 and LOI (limiting O index, JIS K 7201) 28.0.
475101 76 PF, 2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5,5) undecans 3,9-bis(diphenylmethyl)-3,9-dioxide
RI. IMF (Industrial manufacture); MOA (Modifier or additive use); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

Results 10/541021

51 of 76

RL: IMF (Industrial manufacture); MOA (Modifier or additive use);

(RE: (Preparation); USES (Uses)

(aromatic polyester composition containing organic phosphate fireproofing

t for halogen-tree molding) 6-2284-92-8 CAPLUS 2-4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

/022

ANSI-NO OP 62 CARGUS CORVRIGHT POOR ACS ON STUNCTURE 140:111529
140:111529
Preparation of high-purity pentaerythritol spirocyclic bis(phosphonate)s as fireproofing agents for resins
Yanagida, Takatsune: Tanabe, Seiichi; Imamura, Koichi; Taketani, Yutaka
Teijin Chemicais Ltd., Japan
Jpn. Kokai Tokkyo Koho, 17 pp.
CODEN: JXXXAF
Patent

Patent

Japanese

PATENT NO. DATE KIND JP 2004018386

Α PRAI JP 2002-171212

DATE 040122 20020612

APPLICATION NO. DATE JP 2002-171212 20020612

CASREACT 140:111522; MARPAT 140:111522

The title bis(phosphonate)s I (Ar1, Ar2 = C6-20 aryl, R1-R4 = H, C6-20 aryl, C1-20 hydrocarbyl) are prepared by heating II (Ar1, Ar2, R1-R4 = same as above) having purity 295% in the presence of halogenated compds. at 80-200°. Thus, II (R1-R4 - H, Ar1 - Ar2 - Ph; purity 98%) was heated in the presence of Results 10/541021

50 of 76

(fireproofing agents, spirodiphosphate-fireproofed aromatic polyester-based resin compns. free from halogens)
475101-76-9 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

AN 2004:52866 CAPLUS CONTRICHT 2007 ACS ON STN

140:112203

DN 140:11203
TI Aromatic polyester composition containing organic phosphate fireproofing agent and molding of the composition
IN Yamanaka, Katsuniro, Taketani, Yutaka
PA Teijin Chemicals Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 42 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1
PATENT NO. KIND DATE APPLICATION NO. DATE

KIND PI JP 2004018585 PRAI JP 2002-172650 OS MARPAT 140:112203 GI

20040122

JP 2002-172650

20020613

The composition contains 100 parts of a resin containing 260% of an aromatic polyester, 1-100 parts of the organic phosphate I (Ar1, Ar2 = Ph, naphthyl, anthryl; R1-R4 = H, C1-5 aliphatic hydrocarbyl, Ph, naphthyl, anthryl; Al1, AL2 = C1-5 branched or linear aliphatic hydrocarbyl; Ar3, Ar4 = Ph, naphthyl, anthryl; p, q = 0-3; each of Ar3 and Ar4 may be linked with Al1 and AL2; Ph, naphthyl, and anthryl may be substituted with aromatic ring) as the claimed fireproofing agent, 0-50 parts of a resin for improvement of fire resistance, and 0-200 parts of a filler. The composition is molded to give the halogen-free fire-resistant molding. Thus, 100 parts poly(butylene terephthalate) (TRB-H) and 15 parts 2.4,8.10-terrooxa-3,9-diphophaspirol5.5) undecane 3,9-di(2-phenylethyl)-3,9-dioxide were blended, mixed with chopped glass fiber, and injection-molded to give test pieces UL-94 flame retardance V-0 and limiting oxygen index (LOI) 27.5.

Results 10/541021

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PhCH2BT at 150° to give I (R1-R4, Ar1, Ar2 = same as above) showing purity 99% with selectivity 95%.
20544-37-09, 3,9-Dibenzyl-2,4,8,10-Tetraoxa-3,9diphosphaspiro[5.5]undecane 3,9-dioxide 475101-74-79
475101-76-99, 3,9-Bis(benzhydryl)-2,4,8,10-Tetraoxa-3,9diphosphaspiro[5.5]undecane 3,9-dioxide
Ri: IMF (Industrial manufacture); SPN (Synthetic preparation), PREP

(preparation of high-purity pentaerythritol spirocyclic bis(phosphonate)s

fireproofing agents for resins by heating corresponding diphosphites

with halogen compds.) 20544-37-0 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

475101-74-7 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

475101-76-9 CAPLUS

2.4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphonylmethyl)-, 3,9-dioxide (9C1) (CA INDEX NAME)

ANSHER TY OF 62 CAPLUS PRODUCTION ACS ON SIN

Preparation of low-volatile pentaerythritol spirocyclic bis(phosphonate)s as fireproofing agents for resins Imamura, Koichi, Tanabe, Seiichi, Ando, Shinichi, Taketani, Yutaka Teijin Chemicals Ltd., Japan

Results 10/541021 53 of 76 Jpn. Kokai Tokkyo Koho, 13 pp. CODEN: JKXXAF Patent Japanese FAN. CNT 1 PATENT NO. DATE 2040122 20020612 APPLICATION NO.
JP 2002-171211 PI JP 2004018938 A 9040122 PRAI JP 2002-171211 70020612 OS CASREACT 140:111521; MARPAT 140:111521

Ar1-c-c-o-p' P-o-c-c-Ar2

The title bis(phosphonate)s I (Ar1, Ar2 * C6-20 aryl, R1-R8 * H, C6-20 aryl, C7-30 aralkyl, C1-20 hydrocarbyl) are prepared by heating II (Ar1, Ar2, R1-R8 * asme as above) in the presence of halogenated compds. at 120-250*. For decreasing content of residual volatile substances to \$5000 pps. the crude I may be washed with R5OH (R5 * C1-10 alkyl) at \$0-120*. Thus, II (R1-R8 * H, Ar1 * Ar2 * Ph) was heated in the presence of PR(CH2)2Br at 180*, filtered, refluxed with MeOH, washed with MeOH, and dried to give 87% I (R1-R8, Ar1, Ar2 * asme as above) showing purity >99% and content of residual volatile substances 300 pps.

52284-V0-SP, 3,9-Bis(2-phonylethyl)-2,4,8,10-tetraoxa-3,9diphosphaspiro(5.5) undecane 3,9-dioxide
RL: IMF (Industrial manufacture); PUR (Purification or recovery); SPN (Synthetic preparation); PFEP (Preparation);
(preparation of low-volatile pentaerythricol spirocyclic bis(phosphonate)s as fireproofing agents for resins by heating corresponding diphosphites with halogen compds.)
62284-92-8 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5) undecane, 3,9-bis(2-phenylethyl)3,9-dioxide (9C1) (CA INDEX NAME)

DATE



Results 10/541021

55 of 76

475101-74-7 CAPLUS 2,4,8,10-Tetraoxe-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethyl)-,3,9-dioxide (9C1) (CA INDEX NAME)

475101-76-9 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

SB 49 05 68 GAPLUS COPYRIGHT 2007 AGS ON STA

ZUDET#32776 CAPLUS Full-text.
140:11220
Low-volatile pentaerythritol spirocyclic diphosphonates as fireproofing agents for resins
Taketani, Yutaka; Yamanaka, Katsuhiro; Imamura, Koichi; Tanabe, Seiichi Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 13 pp.
CODEN: JKXXAF

DATE

20020612

Patent Japanese

ENT 1 PATENT NO. KIND APPLICATION NO. DATE JP 2004018381 20040122 JP 2002-171207

PRAI JP 2002-171207 OS MARPAT 140:112 GI MARPAT 140:112200

Results 10/541021 54 of 76

IS 107-241021

Preparation of low-volatile pentaerythritol spirocyclic bis(phosphonate)s as fireproofing agents for resins Imamura, Koichi; Tanabe, Seiichi; Yanagida, Takatgune; Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 15 pp. CODEN: JKXXAF
Patent Japanese
CKT 1

DT Pac.
LA Japanes.
FAN.CNT 1
PATENT NO. KIND DATE APPLICATION NO. DATE 20040122 PI JP 2004018384 A 20040122 PRAI JP 2002-171210 20020612 OS CASREACT 140:111520; MARPAT 140:111520 JP 2002-171210 20020612

The title bis(phosphonate)s I (Ar1, Ar2 * C6-20 ary1; R1-R4 * H, C6-20 ary1, C1-20 hydrocarby1) are prepared by heating II (Ar1, Ar2, R1-R4 * same as above) in the presence of halogenated compds. at 80-200*. For decreasing content of residual volatile substances to \$500 pm, the crude I may be washed with R5OH (R5 * C1-10 alky1) at \$0-120*. Thus, II (R1-R4 * H, Ar1 * Ar2 * Ph) was heated in the presence of PhORLER at 150*. filtered, refluxed with MeOH, washed with MeOH, and dried to give 82¥ I (R1-R4, Ar1, Ar2 * same as above) showing purity >99% and content of residual volatile substances \$00 pms.

above) showing purity >99% and content of residual volatile substances 500 ppm.
20544-37-07, 3,9-Dibenzyl-2,4,8,10-Tetraoxa-3,9diphosphaspiro[5,5]undecane 3,9-dioxide 475701-74-1F
475101-76-94, 3,9-Bis(diphenylmethyl)-2,4,8,10-Tetraoxa-3,9diphosphaspiro[5,5]undecane 3,9-dioxide
RL: INF (Industrial manufacture); PUR (Purification or recovery); SPN
(Synthetic preparation); FEEP (Fregaration);
(preparation of low-volatile pentaerythritol spirocyclic bis(phosphonate)s
as fireproofing agents for resins by heating corresponding diphosphites
with halogen compds.)
20544-37-0 CAPUUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5,5]undecane, 3,9-bis(phenylmethyl)-,
3,9-dioxide (CA INDEX NAME)

Results 10/541021

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IT

NEW ANSWER SO OF SEC CAPBUS COPYREGUE 2007 ACS ON SETT TO 2004 152775 CAPBUS FULL TEXT

140:112199 Low-volatile pentaerythritol spirocyclic diphosphonates as fireproofing Low-volatile pencery(firto) spirocyclic diphosphonates as liteprobling agents for resins
Taketani, Yutaka; Mamanaka, Katsuhiro; Imamura, Koichi; Tanabe, Seiichi Teija Chemicals Ltd., Japan
Jpn. Kokal Tokkyo Koho, 15 pp.
CODEN: JKXXAF

PA SO

DT

DT Patent LA Japanese FAN.CNT 1 PATENT NO. DATE KIND APPLICATION NO. DATE PI JP 2004018380 PRAI JP 2002-171206 OS MARPAT 140:112199 GI 20040122 JP 2002-171206 20020612

The diphosphonates I (Ar1, Ar2 = C6-20 aryl; R1-R4 = H, C6-20 aryl, C1-20 The opposphointees I (RII, AIZ = CS-20 ary); RI-M4 = H, CS-20 ary), CI-20 hydrocarby) have content of residual volatile substances of \$5000 ppm. Thus, pellets comprising 100 parts Suntac UT 61 (ABS) and 15 parts I (AII = AIZ = PH, RI-M4 = H; residual volatile substance 350 ppm) were injection-molded to give a test piece showing fire resistance (UL 94) V-2. No deposition was observed in the injection mold after molding 500 times.

20564 d7-07 435101-74-77 475101-76-79,
2,4,8,10-76craoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-, 3,9-dioxide
RL: IMF (Industrial manufacture); MOA (Modifier or additive use);
PREF (freparation); USES (Uses)
(low-volatile pentaerythritol spirocyclic diphosphonates as fireproofing agents for resins)
20544-37-0 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

475101-74-7 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(1-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

475101-76-9 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

SWER STOF 627 CAPLUS T COPYRIGHT 2007 ACS ON STN

Results 10/541021

475101-76-9 CAPLUS

4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-3,9-dioxide (9CI) {CA INDEX NAME}

NSTERNESS OF CALIFORNUS COPYRIGHT 2000 MACS NOW STOWN

Full-text

140:94927

Preparation of pentaerythritol diphosphonates with low yellowness index Preparation of pentaerythritol diphosphonates with low yellowness index and good hue Taketani, Yuteka; Yamanaka, Katsuhiro; Imamura, Koichi; Tanabe, Seiichi Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 13 pp. CODEN: JKXXAF Patent

PA

рΤ

LA Japanese FAN.CNT 1

PATENT NO. JP 2004010589

DATE KIND 20020611

APPLICATION NO. DATE JP 2002-169891 20020611

PRAI JP 2002-169891 MARPAT 140:94927

 $Ar^{1} = \begin{cases} R^{1} & R^{3} & 0 & 0 \\ \vdots & \vdots & \ddots & 0 \\ R^{2} & R^{4} & 0 & 0 \end{cases}$

The title compds. I [Ar1, Ar2 = (un)substituted C6-20 aryl, R1-R8 = H, (un)substituted C6-20 aryl, C7-30 aralkyl, (un)saturated C1-20 hydrocarbyl) having yellowness index (YI) S8, L value 265, a value 50.5, and b value 54.0, are prepared The compds. are especially useful as fireproofing agents for resins. Thus, a test piece prepared from 100 parts polybutylene terephchalate (TRB-H) and 20 parts 3,9-di(2-phenylethyl)-2,4,8,10-tetraoxa-3,9-

Results 10/541021

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Results 10/3-410/21

Preparation of pentaerythritol diphosphonates with low acid value

Taketani, Yutaka, Yamanaka, Katsuhiro; Imamura, Koichi, Tanabe, Selichi

Taijin Chemicals Ltd., Japan

Jpn. Kokai Tokkyo Koho, 14 pp.

CODEN: JKXXAF

P Patent

LA Japanese

FAN.CNT 1

PATENT NO. KIND DATE APPLICATION NO. DATE

PI JP 2004010586 PRAI JP 2002-169888

10040115 20020611

JP 2002-169888 20020611

MARPAT 140:94947

The title compds. I [Ar1, Ar2 = (un)substituted C6-20 aryl; R1-R4 = H, (un)substituted C6-20 aryl, (un)saturated C1-20 hydrocarbyll, having an acid value of 50.7 mg KOH/g and a purity of 294%, are prepared The compds. as fireproofing agents for resins. Thus, a test piece prepared from 100 parts polybutylene terephthalate (TRB-H) and 20 parts 3.9-dibhenyl-2.4, 8.10-terraoxa-3.9-diphosphaspiro(5.5)undecane 3.9-dioxide (II) (acid value 0.06 mg KOH/g, purity 99%) showed UL-94 flammability rating V-0, vs. V-2, for a test piece containing II with acid value 2.5 mg KOH/g. 20544-37-0P 475101-74-7P 475101-76-FP RL: IMF (Industrial manufacture); MOA (Modifier or additive use), PREF (Proparation); USES (Uses) (preparation of pentaerythritol diphosphonates with low acid value for fireproofing agents) 20544-37-0 CAPUS 2.544-37-0 (APUS 2.544-37-0 CAPUS 3.9-diphosphaspiro[5.5]undecane, 3.9-bis(phenylmethyl)-, 3.9-dioxide (CA INDEX NAME)

475101-74-7 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethyl)-,3,9-dioxide (SCI) (CA INDEX NAME)

Results 10/541021

60 of 76

diphosphaspiro[5.5]undecane 3.9-dioxide (YI 1.08, L 95.95, a -0.17, b 0.53) showed UL-94 flammability rating V-0.
62294-92-3P, 3.9-Bis(2-phenylethyl)-2.4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane3,9-dioxide
RL: IMF (Industrial manufacture): MOA (Modifier or additive use);
PEEP (Preparation); USES (Uses)
PEEP (Preparation); OSES (Uses)

fireproofing agents)
62284-92-8 CAPUUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis{2-phenylethyl}-, 3,9-dioxide (9CI) (CA INDEX NAME)

AN 2004:32608 CAPIUS FOIT LONG
AN 140:94926
TI Preparation of pentaerythritol diphosphonates with low yellowness index and good hue
IN Taketani, Yutaka, Yamanaka, Katsuhiro; Imamura, Koichi; Tanabe, Seiichi
PA Teijin Chemicals Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 14 pp.
CODEN: JKXXAF
TP PATENT
LA Japanese
FAN.CRT 1
PATENT NO.

PATENT NO. KIND PI JP 2004010588 PRAI JP 2002-169890 OS MARPAT 140:94926 GI

DATE 20020611 20020611

APPLICATION NO. JP 2002-169890

DATE 20020611

The title compds. I [Ar1, Ar2 = (un)substituted C6-20 aryl; R1-R4 = H, (un)substituted C6-20 aryl; (un)saturated C1-20 hydrocarbyll, having yellowness index (Y1) 58, L value 285, a value 50.5, and b value 54.0, are prepared The compds. are especially useful as fireproofing agents for resins. Thus, a test piece prepared from 100 parts polybutylene terephthaltae (TRB-H) and 20 parts 3,9-dibenzyl-2,4,8,10- tetraoxa-3,9-diphosphaspiro[5.5]undecane

3,9-dioxide (YI 3.10, L 95.57, a -0.27, b 1.65) showed UL-94 flammability rating V-0 and good hue. 25644-27-09 475161-479-475161-76-9P RL: IMF (Industrial manufacture); MOA (Modifier or additive use); EPEP (Preparation);

fireproofing agents)
20544-37-0 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-,
3,9-dioxide (CA INDEX NAME)

475101-74-7 CAPLUS 2.4.8,10-Tetraox-3.9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethyl)-,3,9-dioxide (9C1) (CA INDEX NAME)

475101-76-9 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-,3,9-dioxide (9C1) (CA INDEX NAME)

ANSHER 50 OF CALCAPHUS COPYRIGHT 2009 AGG COLETTY AN 2004:32607 CAPLUS Full-Lext DN 140:94925

140:94925
Preparation of pentaerythritol diphosphonates with low acid value
Taketani, Yutaka, Yamanaka, Katsuhiro; Imamura, Koichi; Tanabe, Seiichi
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 12 pp.
CODEN; JKXXAF

DT Patent

LA Japanese FAN.CNT 1

Results 10/541021 63 of 76 030925

PI JP 2003267984 PRAI JP 2002-66600 CASREACT 139:277001; MARPAT 139:277001

The title compds. I [R1, R4 = H, Ar(R7)n; R2, R3, R5, R6 = Ar(R7)n; Ar = Ph, naphthyl, anthryl, pyridyl, thiazyl; n = 0.5; R7 = Me, Et, Pr, Bu, aryloxy, arylthio, etc.] are prepared by reaction of pentaerythritol with phosphonic acid dinalides. E.g., pentaerythritol (46.1 g) was esterified with 2058.5 g Ph2CHP(0)[212 (preparation given) in CHCl3 in the presence of pyridine at 60° for 6 h to give 1186.2 g I (R1 = R4 = H, R2 = R3 = R5 = R6 + Ph), which was added to polypropylene at 30 phr and injection-molded to give a test piece showing fire resistance (UL 94) V-2.

20020312

JP 2002-66600

479:201-76-92

Ri. IMF (Industrial manufacture); MOA (Modifier or additive use); SPN (Synthetic preparation); PESP (Preparation), USES (Uses) (preparation of pentaerythritol diphosphonates as fireproofing agents for polymers)
475:101-76-9 CAPLUS
2,4,8,10-76:retraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

ANSWER 35 OF 62/ CARRUS GOPWRIGHT-2000 AGS ON STAF 2002;886823 CAPRUS <u>Full-text</u>

2102:88883 CAPLOS Full-text
137:37085F
Flame-retardant polyester-based resin compositions containing organic phosphorous compounds and molded articles therefrom Yamanaka, Katsuniro, Taketani, Yutaka
Teijin Chemicals, Ltd., Japan
PCT Int. Appl., 95 pp.
CODEN: PIXXO2

DT Patent LA Japanese FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2002092690	Al	20021121	WO 2002-JP4659	2002051
	W: CN, KR, US				

Results 10/541021 62 of 76

PATENT NO KIND DATE APPLICATION NO. DATE PI JP 2004010587 PRAI JP 2002-169889 OS MARPAT 140:94925 20040115 20020611 JP 2002-169889 20020611

The title compds. I (Ar1, Ar2 * (un)substituted C6-20 aryl; R1-R8 * H, (un)substituted C6-20 aryl, C7-30 aralkyl, (un)saturated C1-20 hydrocarbyll, having an acid value of 50.7 mg KOH/g and a purity of 294%, are prepared The compds. are especially useful as fireproofing agents for resins. Thus, a test piece prepared from 100 parts polybutylene terephthalate (TRB-H) and 20 parts 3,9-bis(2-phenylethyl)-2.4,8,10-tetraoxa-3,9- diphosphaspiro(5.5]undecane 3,9 dioxide (II) (acid value 0.03 mg KOH/g, purity 99%) showed UL-94 tlammability rating V-0, vs. V-2, for a test piece containing II with acid value 1.3 mg KOH/g,

KOH/g. 60234 92-65, 3,9-Bis(2-phenylethyl)-2,4,8,10-tetraoxa-3,9-

60294 92-60, 3,9-Bis(2-phenylethyl)-2,4,8,10-tetraoxa-3,9-diphosphaspire[5.5]undecane 3,9-dioxide RL: IMF (Industrial manufacture); MOA (Modifier or additive use); PREF (Erephration; VBSE (Uses) (preparation of pentaerythritol diphosphonates with low acid value for fireproofing agents) 62284-92-8 CAPLUS

22,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

Ansuer 55 OF 62 CAPUUS COPVENCHE 2007 AGS on Still

DN 139:277001
TI Preparation of pentaerythritol diphosphonates and their use as fireproofing agents for polymers
IN Ando, Shinichi, Taketani, Yutaka
PA Teijin Chemicals Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 12 pp.
CODEN: JXXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.

KIND DATE APPLICATION NO. DATE

20050615

Results 10/541021 64 of 76

> RM: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT. SE, TR
> JP 2003034749 A 20030207 JP 2002-138136 20020514 EP 1408085 20040414 EP 2002-769597 20020514 R: AT, BE, CH. DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,
>
> IE, FI, CY, TR
>
> CN 1509314 A 20040630 CN 2002-810103 200220514
>
> JP 2003160722 A 20030606 JP 2002-165449 20020606 JP 2002-165449 JP 2002-165450 US 2003-476390

CN 1509314
JP 2003160722
JP 2003160722
JP 2003213109
US 2004127611
US 70837667
US 200525293
PRAI JP 2001-144478
JP 2001-147478
JP 2001-347212
MO 2002-347659
US 2003-4763905
CS MARPAT 137737085
BT 1116 c Compns. com 20040630 20030606 20030730 20040701 20060808 20051117 20010515 20010917 20011113 20020514 20031031 A1 B2 A1 9 200 5 5 1 5 28 727

Title compns. comprising (A) a resin component comprising ≥60 aromatic polyester resin 100, (B) a organophosphorus compound with acid value ≤0.7 mgKOH/g, (C) a resin for improving flame retardancy 0-50, and (D) a filler 0-200
parts, are substantially halogen free, and meet UL94 V-2 or meet UL94 V-0
under suitable conditions. Thus, 6.81 parts pentaerychritol and 13.76 parts
trichlorophosphine were reacted at 60° to give a 2,4,8,10-tetraoxa-3,9diphosphaspiro[5.5] undecane, 3,9- dibydro-3,9-dioxide, 10,94 parts benzyl
bromide was added therein to give a 2,4,8,10-tetraoxa-3,9diphosphaspiro[9.5] undecane, 3,9-dibenzyl-3,9- dioxide with acid value 0.06 mgKOH/g, 15 parts of which was mixed with 100 parts TRB-H to give a composition
showing good flame retardancy.
20544-17-0P ACCR4-92-92-98 A75101-74-7P
1751-176-94
RI. IMF (Industrial manutacture); MOA (Modifier or additive use);
FREP (Proparalich); USES (Uses)
(flame retardant; preparation of organic phosphorous flame retardants for
halogen free flame-retardant polyester resin compns.)
20544-37-0 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5] undecane, 3,9-bis(phenylmethyl)-,
3,9-dioxide (CA INDEX NAME) Title compns. comprising (A) a resin component comprising ≥60 aromatic

62284-92-8 CAPLUS 2.4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-,3,9-dioxide (9CI) (CA INDEX NAME)

475101-74-7 CAPLUS
2.4.8.10-Tetraoxa-3.9-diphosphaspiro[5.5]undecane, 3.9-bis(1-phenylethyl)3.9-dioxide (9CI) (CA INDEX NAME)

475101 - 76 - 9 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

RECOT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD ALL CITATIONS AVAILABLE IN THE RE FORMAT

ANSHER 150 OF 521 3 CAPIUS COPYRIGHT 2007 ACS-ON-STN D 1980: 59635 CAPIUS Full-text

**COVERGE SOC. CAPTURE TO COVERGE TO 2007-ACS-ON-STW.D 1980:59635 CAPLUS FUll-text 92:59635 Penteerythrityl diphosphonate-ammonium polyphosphate combinations as flame retardants for olefin polymers Hardy, William B., Min, Tae B., Hoffman, Joseph A. American Cyanamid Co., USA U.S., 4 pp. CODEN: USXXAM PALONI SUXXAM PALONI English CMT 1

APPLICATION NO.

DATE

19780505

	PATENT NO.	KIND	DATE
19	US 4174343	A	19791
PRAI	US 1978-903294	A	19780
g (

19791113 US 1978-903294 19780505

Certain pentaerythritol diphosphonates (I, R = Me, Ph, benzyl, CN), containing ammonium polyphosphate (except for R = CN), give self-extinguishing,

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72551-88 3 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-nghthalenylmethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

72551-89-4 CAPLUS
2.4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis[{4-bromophenyl}methyl]-, 3,9-dioxide (9CI) (CA INDEX NAME)

72561-29-6 CAPLUS 2.4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis[(4-chloropheny)]methyll-, 3,9-dioxide (9CI) (CA INDEX NAME)

ANSHER SEPONDE TELEPLUS COPYRIGHT 2007 ACS on STN 1978:511298 CAPLUS Pull-text Correction of: 1975:565050 89::11298 Correction of: 83:165050 Phosphonospirobisphenols as flame-resistant additives for resins

Results 10/541021

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nondripping flame retardant compns. when added to polyplefins. Thus, polypropylene [9003-07-0] 70, dimethylpentaerythrityl diphosphonate [3001-98-7] 15, and ammonium polyphosphate 15 parts were extruded into cylindrical specimens which were exposed 10 s to a 3/4 in. blue flame. The samples did not ignite or melt drip.

20544-37-0

TТ RL: USES (Uses)

(flame retardants, containing ammonium polyphosphate, for polyolefins) 20544-37-0 CAPLUS

2.4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

71325-59-9P 71325-92-1P 72551-87-2P 72551-80-1P 72551-80-1P 72551-29-6P RL: PREP (Preparation) (preparation of) 71325-80-9 CAPUS 2,4,8,10-9 Capus 2,9,9,10-9 Capus 2,4,8,10-9 Capus 2,9,9,10-9 Capus 2,4,8,10-9 Capus 2,9,9,10-9 Capus 2,9,9,10-9 Capus 2,9,9,10-9 Capus 2,9,9,10-9 Capus 2,9,10-9 Capus 2,9,10-9

71325-82-1 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis[(2,4,6-trimethylphenyl)methyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

72551-87-2 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis[(2,4-dimethylphenyl)methyl]-, 3,9-dioxide (9CI) (CA INDEX NAME)

Results 10/541021

68 of 76

Mueller, Albrecht, Renner, Alfred Ciba-Geigy A.-G., Switz. Ger. Offen., 23 pp. CODEN: GWXXBX

IAN	. CNT 1					
	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE	
ΡI	DE 2456532	A1	19750605	DE 1974-2456532	19741129	
	CH 582195	A5	19761130	CH 1973-16895	19731203	
	ES 432497	Al	19761101	ES 1974-432497	19741202	
	GB 1487609	A	19771005	GB 1974-52111	19741202	
	FR 2253024	A1	19750627	FR 1974-39479	19741203	
	JP 50084587	A	19750708	JP 1974-140105	19741203	
DDA	T (TH 1973-16895		19771207			

JP 50084587 A 19750708 JP 1974-140105 19741203
The compds. I with R = 4(or 2)-hydroxy-3,5-dimethyl(or dichloro)phenyl, 2-hydroxy-shentyl)phonyl were prepared The compds. had good hydrolysis resistance and were useful as diglycidyl ethers, for preparing fire-resistant resins. Thus, 270 g (4-hydroxy-3,5-dimethyl)phonyl) dimethylamine (42900-95-8) and 223 trimethyl phosphite (121-45-9) in 1,4-dioxane were refluxed to prepare dimethyl (4-hydroxy-3,5-dimethyl)phonate (1873)-62-1) which (48.8 g) was mixed with 13.6 g pentaerythritol [115-77-5] in sulfolane and heated at 250-280° to prepare I (R = 4-hydroxy-3,5-dimethyl)phonyl) (II) [8-733-67-6]. A mixture of 99.2 g II, 1 L epichlorohydrin [106-89-8], and 4 g NRI4Br was heated to 90-100°, cooled to 80°, and treated during 1 h with 24 g NaOwe to prepare II diglycidyl ether [f673)-69-7]. II and bisphenol A diglycidyl ether were used to prepare a nonburning resin.
56733-67-69

56793-67-69
RL: RCT (Reactant), SPN (Synthetic preparation); PREP
(Preparation): RACT (Reactant or reagent)
(preparation and reaction of, with epichlorohydrin)
56793-67-6 CAPLUS
Phenol, 4,4'-[(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5] undecane-3,9-dipl)bis(methylene)]bis[2,6-dimethyl(9CI) (CA INDEX NAME)

IT

56733-56-3F 56732-57-4P 56733-53-5P 56733-59-6P 5673)-68-7P 56778-54-2P RL: PREP (Preparation of) 56733-55-3 CAPLUS Phenol, 4,4'-[(2,4,8,10-tetraoxa-3,9-dioxido-3,9-diphosphaspiro[5,5]undecane-3,9-diyl)bis(methylene)}bis(2,6-dichloro-(9CI) (CA INDEX NAME)

56733-57-4 CAPLUS
Phenol, 2,2'-[(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5,5]undecane-3,9-diyl)bis(methylene)]bis- (9CI) (CA INDEX

56733-58-5 CAPLUS
Phenol, 2,2'-[(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5] undecane-3,9-diyl)bis(methylene)]bis[4,6-dimethyl-(9CI) (CA INDEX NAME)

56733-59-6 CAPLUS
Phenol, 2,2'-[(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane-3,9-diyl)bis(methylene)|bis[4,6-dichloro-(9CI) (CA INDEX NAME)

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis[[3,5-dimethyl-4-(oxiranylmethoxy)phenyl]methyl]-, 3,9-dioxide (9CI) (CA INDEX NAME)

Results 10/541021 71 of 76

51837-04-8 53833-06-0
RL: USES (Uses)
(antioxidant, for polypropylene, manufacture of)
53833-04-8 CAPLUS
Phenol, 4,4'-[(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5,5] undecane-3,9-diphosphaspiro[5,5] undecane-3,9-diyl)di-2,1-ethanediyl]bis[2,6-dimethyl-(9CI) (CA INDEX NAME)

\$3833-06-0 CAPLUS
Phenol, 4,4'-[(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5] undecane-3,9-diyl)bis(methylene)|bis[2,6-bis(1,1-dimethylethyl)- (9CI) (CA INDEX NAME)

S19.3-95-99
RL: (REF (Preparation)
(preparation of)
5383-05-9 CAPLUS
Phenol, 2,2'-[(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5,5)undecane-3,9-dipl)bis(methylene)]bis[6-(1,1-dimethylethyl)-4-methyl- (9CI) (CA INDEX NAME)

ANGWER 60 OF BRANCAL CAPLUS CONTRICUED SOOT ACS ON STIN Full-text

PAGE 1-B

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56778-54-2 CAPLUS
Phenol, 2,2'-[(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane-3,9-diyl}bis(methylene)|bis[4-methyl-(9CI)(CA_INDEX_NAME)

ANSWER 53-09-62-CAPLUS FOOPYRIGHT 2007 AGS TORBSTN N 1977:90946 CAPLUS Full-text

DN 96:90946
TI Hindered phenol pentaerythritol phosphonate
IN Hechenbleikner, Ingenuin; Enlow, William P.
Borg-Watner Corp., USA
SO Brit., 8 pp.
CODEN: BRXXAA
DT Patent
LA English
FAN.CNT 1
PATENT NO. KIND DATE APPLICATION NO KIND A A DATE DATE APPLICATION NO. PI GB 1439092 PRAI GB 1974-16786 19760609 19740417 GB 1974-16786 19740417

OB 1974-16786 A 19740417

Three title compds, were manufactured which were useful as antioxidants and fire retardants for polymers and rubbers. Thus, a mixture of 256 g 3,9-dimethoxy-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane [7093-29-0] in 1. PhMe and 509 g 3,5-di-tetr-touty1-4-hydroxybenzyl chloride [955-01-1] in 500 ml heptane was heated 3 hr at 100-10°, distilling off MeCl, cooled, filtered, and washed with PhMe to give 90% 3,9-bis(3,5-di-tetr-buty1-4-hydroxybenzyl)-3,9-dioxo-2,4,8,10-tetraoxa-3,9- diphosphaspiro[5.5]undecane (1) [5-32-60]. Polypropylene [9003-07-0] powder was stabilized by blending with 0.5% [.

Results 10/541021 72 of 76

2,3,5-Trialky1-4-hydroxybenzyl phosphonates and phosphinates Spivack, John D. Clba-Geigy Corp., USA U.S., 11 pp. CODEN: USXXAM Patent English TI IN

FAN.	CNT 2					
	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE	
PI	US 3962377	A	19760608	US 1974-492089	1974072	
	ZA 7405384	A	19750827	ZA 1974-5384	1974082	
	BE 820259	A1	19750324	BE 1974-148819	1974092	
	FR 2244759	A1	19750418	FR 1974-32107	1974092	
	DK 7405021	Α	19750602	DK 1974-5021	1974092	
	GB 1476994	A	19770616	GB 1974-41429	1974092	
	NL 7412670	A	19750327	NL 1974-12670	1974092	
	JP 50060481	Α	19750524	JP 1974-110364	1974092	
PRAI	US 1973-400601	A2	19730925			

The title compds. I [R = Me3C, Me3CCH2CMe2; R1 = R2 = EtO, BuO, MeO, Me(CH2)110, Me(CH2)170, Me(CH2)175CH2CH2O; R1 = Me(CH2)110, R2 = Ph] were prepared Thus, II was heated with (MeO)2POH in DMF at 60° apprx.20 hr to give I (R = Me2C, R1 = R2 = MeO). I are stabilizers for polymers subject to oxidative, thermal and photochem. degradation \$5719-65-2P\$
RL: SPN (Synthetic preparation); PREP (Fregatation); (preparation of); 55719-69-2 CAPLUS
Phenol. 4.4'-[(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5,5)undecame-3,9-diylibis(methylene)]bis[6-(1,1-dimethylethyl)-2,3-dimethyl- (9CI) (CA INDEX NAME)

IT

PKEZEZCARLUS; CORYRIGHT 2000 ACS ON ASTU-CAPLUS Full-text

a Can't Find levore in EAST, ele puis up incorract Phosphonospirobisphenols as flame-resistant additives for resins

Mueller, Albrecht; Renner, Alfred Ciba-Geigy A.-G., Fed. Rep. Ger. Ger. Often., 23 pp. CODEN: GWXXBX SO

DТ

Patent German FAN, CNT

PATENT NO. KIND DATE APPLICATION NO. DATE

DATE APPLICATION NO. DATE

DE 2456523 A1 19760812 DE 1974-2456523 19741129

FOR diagram(s), see printed CA Issue.

The compds. I with R = 4 (or 2)-hydroxy-3,5-dimethyl(or dichloro)phenyl, 2-hydroxyphenyl, or 2-hydroxy-5-methylphenyl were prepared The compds. had good hydrolysis resistance and were useful, e.g., as diglycidyl ethers, for preparing fire-resistant resins. Thus, 270 g (4-hydroxy-3,5-dimethylphenyl)dimethylamine (42900-95-8) and 223 g tri-Me phosphite [121-45-9] in 1,4-dioxane were refluxed to prepare d i-Me (4-hydroxy-3,5-dimethylphenyl) phosphonate [56733-62-1] which (48.8 g) was mixed 13.6 g pentaerythrical (115-77-5) in sulfolane and heated at 250-280° to prepare I (R = 4-hydroxy-3,5-dimethylphenyl) [II) [56733-67-6]. A mixture of 99.2 g II, 11. epichlorohydrin [106-89-8], and 49 NEE4Bir was heated to 90-100°, cooled to 80°, and treated during 1 hr with 24 g NaOMe to prepare II diglycidyl ether [56732-68-7]. II and bisphenol A diglycidyl ether [56732-68-7].

RL: USES (Uses)

f(fire-resistant resins containing)

5673)-67-6 CAPLUS

Phenol, 4,4'-(1,9-dioxido-2,4,8,10-tetraoxa-3,9diphosphaspiro[5.5]undecane-3,9-dipl)bis(methylene)]bis(2,6-dimethyl(9CI) (CA INDEX NAME)

56733-68-7 CAPLUS
2.4.8.10-Tertaox8-3.9-diphosphaspiro[5.5]undecane, 3,9-bis[[3.5-dimethyl-4-(oxirany]methoxy)phenyl]methyll-, 3,9-dioxide (9CI) (CA INDEX NAME)

Results 10/541021

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Phenol, 2,2'-[(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane-3,9-diphosphaspiro[5.5]undecane-3,9-diph)bis(methylene)]bis[4,6-dichloro-(9CI) (CA INDEX NAME)

56778-54-2 CAPLUS
Phenol, 2,2'-[(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane-3,9-diyl)bis(methylena)}bis[4-methyl-(9CI)(CA_INDEX_MAME)

418 ANSIER © 07 08 CAPHUS CONTROLL 2007 Ace on Sail y

AND THE COLOR OF THE CONTROL OF THE DATE APPLICATION NO.

CNT 1
PATENT NO. KIND DATE APPLICATION NO. DATE

FR 1503429 19671124 FR 1966-86604 19661208
I CH 19651214
For diagram(s), see printed CA Issue.
The title compds. which are used for modification and hardening of epoxy resins are prepared by treating compds. containing oxirane or oxetane rings with a phosphonic acid hemi-ester followed by internal transesterification of the hydroxy seter formed. Thus, 1096 g, E17PO; was heated 15-20 hrs. with 375 g, 1.4-dichloro-2-butene at 140; 5° until all EtCl was eliminated. The reaction mixture was fractionally distilled and a liquid major fraction (93.5%) was obtained at 149-52*/0.1-0.15 mm. This fraction (n2DD 1.4595) was hydrogenated for 6-7 hrs. in the presence of Pd-C or Raney Ni in dioxane. After separation of dioxane and hydrogenation catalysts, terraethyl butanebisphosphonate (1) was obtained. I was heated 2 hrs. with 10% aqueous NaOH, and cooled to give a di-hemi-ester disodium salt, which was treated with Amberlite JR 120, decolorized with C, and filtered through Kieselguhr to give 660-70 g, di-hemiester (II) in the form of a viscous colorless liquid II was dissolved in absolute alc. and heated gently in the presence of 2 moles p-

PAGE 1-B

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56733-56-2 56733-57-4 56723-56-5 56733-59-6 56778-54-2 RL: USES (Uses)

RL: USES (USES)
(fireproofing agents, for resins)
56733-56-3 CAPLUS
Phenol. 4,4'-[(2,4,8,10-tetraoxa-3,9-dioxido-3,9-diphosphaspiro[5.5] undecane-3,9-diyl)bis(methylene)]bis[2,6-dichloro-(9CI) (CA INDEX NAME)

56733-57-4 CAPLUS
Phenol, 2,2'-[(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane-3,9-diplois(methylene)]bis- (9CI) (CA INDEX

S6733-S8-S CAPLUS Phenol, 2,2'-{(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5,5]undecane-3,9-diyl)bis(methylene)]bis[4,6-dimethyl-(CA INDEX NAME)

56733-59-6 CAPLUS

Results 10/541021

76 of 76

toluidine for each mole II to give the di-p-toluidine salt (III), m. 137.8-8.6°. III could be convorted to the free hemi-ester by cation exchange resins. The hemi-ester could be obtained without passing through III by treating the residue obtained after saponification with alc. and Me2CO, and cooling at -15° to -18° after decolorization to give 1.4-butanebis(monoethy) phosphonate) (IV), m. 73-3.9°. Smilarly prepared were 1.2-ethane bis(monoethy) phosphonate), m. 47.8-8.6°, 1.5-pentenebis(monoethy) phosphonate), m. 47.8-8.6°, 1.5-pentenebis(monoethy) phosphonate), m. 87.7-8.2°, 2.2°-bis(di- and menoethylphosphonoethyl phosphonate), m. 47.8-8.6°, 1.5-pentenebis(monoethyl phosphonate), m. 228.7°. A mixture of 39.06°, butyl glycidyl ether and 60.06°, monethyl bensylphosphoate was heated 1 hr. at 100° to give a mixed ester in the form of an oily liquid This mixed ester was fractionally distilled to give 2-benzyl-4-butoxymethyl-1.3-dioxa-2-oxophospholane). The preparation of y-xylylene-2.2°-bis(4)-phonoxy-1,3-dioxa-2-oxophospholane). The preparation of y-xylylene-2.2°-bis(4)-phonoxy-1,3-dioxa-2-oxophospholane). The preparation of y-xylylene-2.2°-bis(4)-phonoxy-1,3-dioxa-2-oxophospholane). The preparation of y-xylylene-2.2°-bis(4)-phonoxy-1,3-dioxa-2-oxophospholane). The preparation of 1.1-dioxa-2-oxophospholane y-are described. IV (41.12°, was heated 75 min. with 41.26°, 3-ethyl-1-oxacyclobutyl-3-methyl benzyl ether at 200°, dissolved in alc., and treated with Amberlite JRA 66 to give 1.4-butanebis(1,3-dioxa-5-ethyl-5-benzyloxymethyl-2-benzyl-2-oxophosphorinane), m. 136-8°. The preparation of 1,3-dioxa-5-ethyl-5-benzyloxymethyl-2-benzyl-2-oxophosphorinan-5-y-methyl) ether, m. 149-52°, and 2,4,8,10-terroxa-3,9-dioxo-3,9-diphosphaspiro(5.5)undecane, m. 259.5-60.1°, were given. Polypeoxide resin (19,9),9 and 11,7 g. IV were dissolved in HCOMMe2 to a 508 solution, heated to 50°, cast into a film on an Al plate, and cured 2 hrs. at 150° to give a fireproof transparent and elastic film which is insol. in organic solvents.

=> log hold COST IN U.S. DOLLARS SINCE FILE TOTAL ENTRY 327,21 SESSION 551.02 FULL ESTIMATED COST DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS) SINCE FILE SESSION CA SUBSCRIBER PRICE -48.36

SESSION WILL BE HELD FOR 120 MINUTES STN INTERNATIONAL SESSION SUSPENDED AT 07:50:57 ON 06 SEP 2007

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ANSWER 2 OF 2 CAPLUS COPYRIGHT 2007 ACS on STN
L10
AN
     2004:589556 CAPLUS <<LOGINID::20070906>>
DN
     141:124582
ΤI
     Process for production of pentaerythritol diphosphonates
     Tanabe, Seiichi; Yanagida, Takatsune; Imamura, Koichi; Tando, Kazushi;
IN
     Taketani, Yutaka
PΑ
     Teijin Chemicals Ltd., Japan
SO
     PCT Int. Appl., 54 pp.
     CODEN: PIXXD2
DT
     Patent
LA
     Japanese
FAN.CNT 1
     PATENT NO.
                           KIND
                                   DATE
                                                APPLICATION NO.
                                                                          DATE
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PΙ
     WO 2004060900
                           A1
                                   20040722
                                              WO 2003-JP16754
                                                                          20031225
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              CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD,
              GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO,
              {\tt NZ}, {\tt OM}, {\tt PG}, {\tt PH}, {\tt PL}, {\tt PT}, {\tt RO}, {\tt RU}, {\tt SC}, {\tt SD}, {\tt SE}, {\tt SG}, {\tt SK}, {\tt SL}, {\tt SY}, {\tt TJ},
              TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW
         RW: BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ,
              BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE,
              ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK,
              TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG
     AU 2003292814
                                   20040729
                                                AU 2003-292814
                            A1
                                                                          20031225
     EP 1586576
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                                   20051019
                                                EP 2003-768243
                                                                          20031225
              AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,
              IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK
     CN 1735625
                            Α
                                   20060215
                                                CN 2003-80108221
                                                                          20031225
     US 2006116526
                            A1
                                   20060601
                                                US 2005-541021
                                                                          20050628 <--
PRAI JP 2003-177
                            Α
                                   20030106
     WO 2003-JP16754
                            W
                                   20031225
os
     MARPAT 141:124582
GΙ
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AB A process for production of I (Ar1, Ar2 = ary1; R3-R6 = H, ary1, hydrocarbon group) useful as flame retardants comprises reacting PCl3 with pentaerythritol in the presence of an inert solvent to form pentaerythritol dichlorophosphite, reacting pentaerythritol dichlorophosphite with an aralkyl alc. to form a pentaerythritol diphosphite halide, and heat-treating pentaerythritol diphosphite halide at 80-300°. Thus, I (Ar1, Ar2 = Ph; R3-R6 = H) with high purity was prepared in high yield.

Ι

(FILE 'HOME' ENTERED AT 16:20:34 ON 06 SEP 2007) FILE 'REGISTRY' ENTERED AT 16:20:43 ON 06 SEP 2007 FILE 'CASREACT' ENTERED AT 16:20:54 ON 06 SEP 2007 L1 STRUCTURE UPLOADED L2 0 S L1 L3 0 S L1 SSS FULL FILE 'STNGUIDE' ENTERED AT 16:21:30 ON 06 SEP 2007 FILE 'CASREACT' ENTERED AT 16:23:12 ON 06 SEP 2007 STRUCTURE UPLOADED L4L5 0 S L4 L6 STRUCTURE UPLOADED L722 S L6 FILE 'STNGUIDE' ENTERED AT 16:25:46 ON 06 SEP 2007 FILE 'CASREACT' ENTERED AT 16:27:42 ON 06 SEP 2007 L8 STRUCTURE UPLOADED L9 20 S L8 FILE 'STNGUIDE' ENTERED AT 16:28:10 ON 06 SEP 2007 FILE 'CASREACT' ENTERED AT 16:30:50 ON 06 SEP 2007 FILE 'STNGUIDE' ENTERED AT 16:31:05 ON 06 SEP 2007 FILE 'CASREACT' ENTERED AT 16:32:16 ON 06 SEP 2007 L10 STRUCTURE UPLOADED L11 12 S L10 FILE 'STNGUIDE' ENTERED AT 16:32:53 ON 06 SEP 2007 FILE 'STNGUIDE' ENTERED AT 16:35:59 ON 06 SEP 2007 FILE 'REGISTRY' ENTERED AT 16:36:01 ON 06 SEP 2007 L12 STRUCTURE UPLOADED L13 5 S L12 L14 STRUCTURE UPLOADED L15 5 S L14 L16 53 S L14 SSS FULL FILE 'CAPLUS' ENTERED AT 16:37:11 ON 06 SEP 2007 L17 175 S L16 L18 143 S L17 AND PREP/RL FILE 'STNGUIDE' ENTERED AT 16:37:27 ON 06 SEP 2007 FILE 'REGISTRY' ENTERED AT 16:39:43 ON 06 SEP 2007 STRUCTURE UPLOADED L19 L20 3 S L19 L21 46 S L19 SSS FULL FILE 'CAPLUS' ENTERED AT 16:40:04 ON 06 SEP 2007 L22 101 S L21 L23 71 S L22 AND PREP/RL L24 25 S L18 AND L23 FILE 'REGISTRY' ENTERED AT 16:40:35 ON 06 SEP 2007 FILE 'CAPLUS' ENTERED AT 16:41:03 ON 06 SEP 2007

L25 2 S US200!-541021/APPS

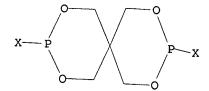
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FILE 'REGISTRY' ENTERED AT 16:41:37 ON 06 SEP 2007

=> d l14

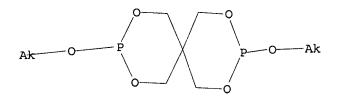
L14 HAS NO ANSWERS

L14 STR



Structure attributes must be viewed using STN Express query preparation.

=> d 119 L19 HAS NO ANSWERS L19 STR



Structure attributes must be viewed using STN Express query preparation.

TIS MANSHERED OF WENT WELCAPLUS COPYRIGHT - 2007 ACS CONSTN 4

146:101607

novel flame retardant of spirocyclic pentaerythritol bisphosphorate for

so

146:101607

A novel flame retardant of spirocyclic pentaerythritol bisphosphorate for epoxy resins
chen. Gui-Hong; Yang. Bing: Mang. Yu-Zhong
Center for Degradable and Flame-Retardant Polymeric Materials, College of Chemistry, Sichuan University, Chengdu, 61064, Peop. Rep. China
Journal of Applied Polymer Science (1907), 102(5), 4978-4982
CODEN: JAPNAS; ISSN: 0021-8985
JOHN Miley & Sons. Inc.
Journal
English
A novel flame retardant for epoxy resins, bisdiglycol spirocyclic
pentaerythritol bisphosphorate (BDSPBP) was prepared from the reaction of
diethylene glycol with spirocyclic pentaerythritol bisphosphorate diphosphoryl
chloride, which was obtained from the reaction of phosphoryl chloride with
pentaerythritol. Flammability of the cured epoxy resin systems consisted of
diglycidyl ether of bisphenol A (DOSBA), low-mol.-weight polyamide and BDSPBP
are investigated by vertical burning test (UL-94) and limiting oxygen index
test (LOI). The results indicate that BDSPBP has good flame retardance on
epoxy. The thermogravimetric anal. (TOA) shows that the epoxy resin
containing BDSPBP has a high yield of residual char at high temps., indicating
that BDSPBP is an effective charring agent. From the SEM observations of the
residues of the flame retardant systems burned, the compact charred layers can
be seen, which form protective shields to protect effectively internal
structure, and inhibit the transmission of heat and heat diffusion during
contacting fire.

T-CT & AS DS*

IT

%: UNITY 46 PJ:
RL: MOA (Modifier or additive use); SPN (Synthetic preparation); PREP
'Preprintion'; USES (Uses)
 (preparation of (Lame retardant spirocyclic pentaerythritol bisphosphorate
 for epoxy resins)
917497-86-0 CAPLUS
Ethanol, 2,2'-[(1,9-dioxido-2,4,8,10-tetraoxa-3,9diphosphaspiro[5,5]undecane-3,9-diyl)bis(oxy-2,1-ethanediyloxy)]bis- (CA
INDEX NAME)

PAGE 1-8

--- СН 2 -- СН 2 --- ОН

IT

714-87-4
RL: RCT (Reactant): RACT (Reactant or reagent)
(preparation of flame retardant spirocyclic pentaerythritol bisphosphorate

10541021-intermediate

diphosphaspiro[5.5]undecane
RL: IMP (Industrial manufacture); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent) (preparation of pentaerythritol diphosphites and diphosphonates) 3643-70-7 CAPLUS 2.4,8.10-7etraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro- (CA INDEX NAME)

7093-28-9 CAPLUS

475101-75-8 CAPLUS
2.4.8.10-Tetraoxa-3.9-diphosphaspiro[5.5]undecane, 3.9-bis(2-phenylethoxy)-[9CI) (CA INDEX NAME)

Ph- CH2-CH2-0--- P P-0-CH2-CH2-Ph

ANSHER 1 OF 24 CAPLUSA COPYRIGHT 2007 YACS ON STN

141:7281
Preparation of pentaerythritol bis(phosphite)s
Yanagida, Takatsune; Ando, Shinichi; Imamura, Koichi; Tanabe, Seiichi;
Tando, Kazushi; Taketani, Yutaka
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 29 pp.
CODEN: JKXXAF
Patent
Japanese
CNT 1
PATENT NO. KIND DATE APPLICATION NO. DATE PI JP 2004149443 A 20040529 PRAI JP 2002-315548 2002103 OS CASREACT 141:7281, MARPAT 141:7281 JP 2002-315548 20021030

for epoxy resins)
714-87-4 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro-,
3,9-dioxide (CA INDEX NAME)

RE.CNT 37 THERE ARE 37 CITED REFERENCES AVAILABLE FOR THIS RECORD ALL CITATIONS AVAILABLE IN THE RE FORMAT

L26THANSMERRIEOPA24 ACAPLUSMECORYRIGHT 2007 ACSMONESTN AN 2004:489688 CAPLUS Full-Lext

141:38738

DN 141:39738
TI Preparation of pentaerythritol diphosphites and diphosphonates
IN Yanagida, Takatsune, Ando, Shinichi, Imamura, Koichi, Tanabe, Seiichi,
Tando, Kazushi, Taketani, Yutake
PA Teijin Chemicals Ltd., Japan
50 Jpn. Kokai Tokkyo Koho, 26 pp.
CODEN: JKXXAF
DT Patent
LA Japanes
PAR.CNT 1
PATENT NO. KIND DATE APPLICATION NO. DATE APPLICATION NO. DATE JP 2004168687 .. JF 2004168687 PRAI JP 2002-334943 OS MARPAT 141:38738 GI 200406176 20021119 JP 2002-334943 20021119

The diphosphites I [X1, X2 = OZAr; Ar = C6-20 (un)substituted aryl, 2 = (un)substituted CH2, C2H4), useful as fireproofing agents, nucleating agents, plasticizers, antioxidants, etc. (no data), were prepared by reaction of pentaerythritol with Pcl3 in inert solvents and reaction of the resulted solns, or suspensions of I (X1 = X2 = Cl) with ArZOH (Ar, Z = same as above) while bubbling inert gases. Pentaerythritol diphosphonates are prepared from the diphosphites by UV irradiation or heating in the presence of halogen compds. Pentaerythritol was treated with Pcl3 in PhWs in the presence of pyridine and treated with benzyl alc. while bubbling N at room temperature for 60 min to give 90.18 I (X1 = X2 = OCN2Ph). 3443 79-7F. Pentaerythritol dichlorophosphite 7091-26-09. 3,9-01benzyloxy-2,4,8,10-tetraoxa-3,9-01bpsphaspiro[5.5]undecane 475101-75-0P, 3,9-Bis(2-phenylethyloxy)-2,4,8,10-tetraoxa-3,9-

10541021-intermediate

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The title compds. I [X = OZAr; Z = (un) substituted CH2, (un) substituted C2H4, Ar = (un) substituted C6-20 aryl], useful as fireproofing agents, nucleating agents, plasticizers, antioxidants, atc., are prepared by reaction of PCI3 with pentearythricol in inert solvents, heating the resulting solns, or suspensions of I (X = Cl) at 40-120*, and successive treatment with ArZOM (Ar, Z = same as I; M = alkali metal). Preparation of pentearythricol bis(phosphonate)s from title compds. is also claimed. E.g., a suspension of I (X = Cl) in PhNe was treated with PhCH2ONa at room temperature for 60 min to give 93-94 I (X = OCH2Ph).
2443-76-79 708-219-29-39-375101-79-99, 3,9-Bis[72-phenylethylloxy]-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane
RL: IMF (Industrial manufacture), RCT (Reactant), SPN (Synthetic preparation), PRSP (Preparation), RAT (Reactant or reagent) (preparation) of pentearythritol bis(phosphice) swith aralkyl alc. alkali metal salte)
244.8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro- (CA INDEX NAME)

7093-28-9 CAPLUS 24.8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethoxy)-(9C1) (CA INDEX NAME)

475101-75-8 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethoxy)-(9CI) (CA INDEX NAME)

L26 ANSWER 4 OF 24 CAPLUS COPYRIGHT 2007 ACS ON STN

140:303859
Preparation of spiro-pentaerythritol diphosphites
Tando, Kazushi, Ando, Shinichi; Tanaura, Koichi; Tanabe, Seiichi;
Yanagida, Takatsune; Taketani, Yutaka
Teljin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 17 pp.
CODEN: JKXXAF
Patent

DТ

AN.	CNII				
	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
19	JP 2004099567	Α	1020040402	JP 2002-266624	20020912
PRAI	JP 2002-266624		20020912		
)S	MARPAT 140:303859				

$$x^1 = p'_0$$
 $p = x^2$

Title spiro compds. I [X1 = Ar2Z20; X2 = Ar3Z30; Ar2, Ar3 = C6-20 (un)substituted aryl; Z2, Z3 = CR7R8, CR9R10CR11R12; R7, R8 = H. C6-20 (un)substituted aryl; C1-20 (un)substituted aryl; C1-20 (un)substituted aryl; R9-R12 = similar group as in R7, R8] are prepared by treatment of I [X1 = X2 = C1] with Ar1Z10H (Ar1 = C6-20 (un)substituted aryl; Z1 = similar group as in Z2 and Z3) in the presence of organic bases as HC1 scavengers, filtering the reaction mixts, to remove the generated salts, and washing the filtrates with aqueous alkalies. After washing, the alkali wastes are reused for washing the products. Thus, I (X1 = X2 = C1) was treated with PhCN2OH and pyridine in MePh, filtered, and the filtrate washed with aqueous NAOH to give 333 I (X1 = X2 = PhCH2O) with 95 purity. The aqueous NAOH waste was recovered and used again for washing another filtrate to give the product with same purity.

RE: IMF (Industrial manufacture); PUR (Purification or recovery); SPN (Synthetic preparation); PRSP (Preparation) (preparation of spiro-pentaerythritol diphosphites, their purification by

ous alkalies, and reusing the alkali wastes) 7093-28-9 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(phenylmethoxy)-(9C1) (CA INDEX NAME)

10541021-intermediate

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$$Ar^{2}-z^{2}-o-p'_{0}$$
 $p-o-z^{3}-Ar^{3}$ III

Title compds. I [Ar4, Ar5 = C6-20 (un)substituted aryl, 24, 25 = CR14R15, CR16R17CR18R19, R14, R15 = H, C6-20 (un)substituted aryl, C1-20 (un)saturated hydrocarbyl; R16-R19 = similar group as in R14, R15], useful for fireproofing agents, etc., are prepared by chlorination of pentaerythritol (III) with PC11 in the presence of inert solvents, successive treatment with Ar12ION [Ar1 = C6-20 (un)substituted aryl, 21 = similar group as in Z4, Z5] in the presence of organic bases, removal of the bases, their salts, and the solvents, and treatment of the resulting spiro-pentaerythritol diphosphites III (Ar2, Ar3 = similar group as in Z1) with R13X (R13 = alkal1 metal, C1-20 alkyl, aralkyl, aryl, etc.; X = Br, iodine) at 80-300°. The removed solvents are recovered and reused in the above process. Thus, II was chlorinated with PCl3 in pyridine and xylene, condensed with PhCH20H, filtered, the filtrate washed with IN NGM, the organic phase evaporated, and refluxed with PhCH20H to give 89% I (Ar424 = Ar525 = PhCH2) with >99% purity. II was similarly reacted in recovered solvent to give the product without decline in yield or purity.

**QAA-Y0-Y-Y, 3, 9-Dichloro-2, 4, 8, 10-tetraoxa-3, 9-diphosphaspiro(5, 5) undecane 7093-38-99.

**QAA-Y0-Y-Y, 3, 9-Dichloro-2, 4, 8, 10-tetraoxa-3, 9-diphosphaspiro(5, 5) undecane from pentaerythritol using recycled solvents)

**QA4-Y0-Y-Y-CAPLUS

**QA-Y-Y-Y-Y-CAPLUS

**QA-Y

2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-dichloro- (CA INDEX NAME)

7093-28-9 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethoxy)-(9CI) (CA INDEX NAME)

ΙT 3642-39 38, 3,9-Dichloro-2,4,8,10-tetraoxa-3,9-

diphosphaspiro[5.5]undecame
RL: RCT (Reactant); SPN (Synthetic preparation); PREP
(Preparation); RACT (Reactant or reagent)
(preparation of spiro-pentaerythritol diphosphites, their purification by

alkalies, and reusing the alkali wastes)
3643-70-7 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro- (CA
INDEX NAME)

ANAMER'S OF 24 CAPIUS COPYRITIT 2007 ACS ON STR.

AN 2004:268555 CAPLUS Puil-text
DN 140:304655
71 Preparation of spiro-pentaerythritol diphosphonates using recycled solvent. Selichi; Ando, Shinichi; Imamura, Koichi; Tando, Kazushi; Yanagida, Takatsune; Taketani, Yutaka
PA Teijin Chemicals Ltd., Japan
Jph. Kokai Tokkyo Koho, 28 pp.
CODEN: JKXXAF
DP patent

Patent Japanese

LA Japa: FAN.CNT 1

PATENT NO. KIND DATE APPLICATION NO. DATE @20040402- JP 2002-266623 20020912 JP 2004099566 PRAI JP 2002-266623 20020912

10541021-intermediate

8 of 34

GI36*MANSHER-6-OF-24 CAPLUS COPYRIGHT 2007-ACS-On-STN AN 2004:268536 CAPLUS FUll-text

140:303854 DN TI

140:303854
Preparation of spiro-pentaerythritol diphosphites in presence of recyclable hydrogen chloride scavengers
Tando, Kazushi; Tanabe, Selichi, Taketani, Yutaka
Teijin Chemicals Ltd., Japan

so

Jpn. Kokai Tokkyo Koho, 18 pp. CODEN: JKXXAF

DT Patent

Japanese

FAN, CNT 1

PATENT NO. KIND DATE APPLICATION NO. DATE 420040402 D JP 2002-262497 JP 2004099500 Α 20020909

PRAI JP 2002-262497 20020909
OS CASREACT 140:303854; MARPAT 140:303854

Title spiro compds. I [X1 = Ar2220; X2 = Ar3230, Ar2, Ar3 = C6-20 (un) substituted aryl; 22, 23 = CR788, CR5R10CR1R12; R7, R8 = H. C6-20 (un) substituted aryl; C1-20 (un) saturated hydrocarbyl; R9-R12 = similar group as in R7, R8] are prepared by treatment of 1 (X1 = X2 = C1) with Ar1210H (Ar1 = C6-20 (un) substituted aryl; Z1 = similar group as in 22 and 23) in the presence of organic bases with water solubility S1 weight% at 20° and 1 atom as HC1 scavengers. Thus, I (X1 = X2 = C1) was treated with PhCH2OH and PhNMe2 in MePh at 20° for 30 min to give 93% I (X1 = X2 = PhCH2O) and to recover 96% PhNMe2.

7093-24-9F RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PASF

(Preparation)
(preparation of spiro-pentaerythritol diphosphites in presence of
water-insol, tertiary amines as recyclable HCl scavengers)
7093-28-9 CAPLUS
2.4,8,10-Tetraoxa-3.9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethoxy)(9CI) (CA INDEX NAME)

ΙT 3643-70-7F, 3,9-Dichloro-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5.5)undecane

2.4,6,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-dichloro- (CA INDEX NAME)

AN 2004/217191 CAPLUS Full-text

CAPLUS Full-text

140:253718
Preparation of high-purity pentaerythritol spirocyclic diphosphonates without purification of intermediates
Tanabe, Selichi; Yanagida, Takatsune; Tando, Kazushi; Imamura, Koichi; Ando, Shinichi; Taketani, Yutaka
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 23 pp.
CODEN: JKXXAF
Patent

IN

DATE

Patent Japanese

FAN. CNT 1 PATENT NO. KIND DATE APPLICATION NO. JP 2004083538 A 200403765 JP 2002-194712 A 20020703 CASREACT 140:253718; MARPAT 140:253718 200403nte JP 2002-263848 20020703

The diphosphonates I (Ar1, Ar2 = C6-20 aryl, R1-R8 = H, C6-20 aryl, C7-30 aralkyl, C1-20 hydrocarbyl), useful as polymer fireproofing agents, are prepared by treatment of pentaerythritol (II) with PCl3 in nonreactive solvents, treatment of the reaction mixts. with ArCRIR2cr3/RAOH (Ar = C6-20 aryl, R1-R4 = same as above) in the presence of organic bases, removal of the organic bases and their salts from the reaction mixts. containing diphosphites III (Ar1, Ar2, R1-R8 = same as above), and heating the reaction mixts in the

10541021-intermediate

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The title bis(phosphonate)s I (Ar1, Ar2 - C6-20 aryl, R1-R4 - H, C6-20 aryl, C1-20 hydrocarbyl), useful as polymer fireproofing agents, are prepared by treatment of pentaerythritol (II) with PCl3 in nonreactive solvents, treatment of the reaction mixts with ArcRIR20H (Ar - C6-20 aryl, R1, R2 - Same as above) in the presence of organic bases, removal of the organic bases and their salts from the reaction mixts. containing diphosphites III (Ar1, Ar2, R1-R4 - same as above), and heating the reaction mixts. in the presence of RX (R = alkali metal, C1-20 alkyl, araklyl, etc; X = Br, iodide) at 80-300°. Thus, Il was sequentially treated with PCl3 in xylene and with PhorH200H in the presence of pyridine, filtered, and the filtrate was washed with aqueous NAOH solution and then heated in the presence of PhCH2Br at 130° to give 90.6% I (R1-R4 - H, Ar1 - Ar2 = PH) with purity 99.1%.

'41 10 79, 3,9-Dichloro-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5,5] undecane 7093-29-79
RIL: IMF (Industrial manufacture); RCT (Reactant), SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

ΙT

polymer fireproofing agents without purification of intermediates) 3643-70-7 CAPLUS

2.4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro- (CA IMDEX NAME)

7093-28-9 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(phenylmethoxy)-(901) (CA INDEX NAME)

- 0- CH2 - Ph

GIME ANSWER OF 14 CAPLUS COPYRIGHT 2007 ACS CONSTN

2004:97533 CAPLUS Full-text 140:146290

10541021-intermediate

10 of 34

475101-75-8 CAPLUS 2.4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethoxy)-(CA INDEX NAME)

L26.MANSMERGREFOP.24. CAPLUS. COPYRIGHT 2002. ACS-on-STN
AN 2004:217190 CAPLUS PUIT-rext
DN 140:253717
Preparation of high-purity pentaerythritol spirocyclic bis(phosphonate)s without purification of intermediates
N Tanabe, Selichi, Yanagida, Takatsune, Tando, Kazushi, Imamura, Koichi, Ando, Shinichi, Taketani, Yutaka
PA Teijin Chemicals Ltd., Japan
S Jpn. Kokai Tokkyo Koho, 24 pp.
CODEN: JKKXAF
P Patent

DT Patent Japanese

PAN. CNT 1

PATENT NO. KIND DATE APPLICATION NO. DATE 200203185 JP 2002-263847 20020703 PI JP 2004083537 A C00403189 PRAI JP 2002-194711 A 20020703 OS CASREACT 140:253717; MARPAT 140:253717 20020910

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IUZI-INIERMEGIAIE

Environmentally friendly preparation of pentaerythritol spirocyclic diphosphites from their corresponding dichlorophosphite
Tando, Kazushi, Tanabe, Selichi; Taketani, Yutaka
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 12 pp.
CODEN: JKXKAF
Patent
Japanese
CNT 1

PATENT NO. KIND DATE APPLICATION NO. DATE A @20040206 JP 2002-194713 PI JP 2004035465 PRAI JP 2002-194713 20020703

CASREACT 140:146290; MARPAT 140:146290

The title diphosphites I (X = OCR1R2Ar1; Y = OCR3R4Ar2; Ar1, Ar2 = C6-20 ary1; R1-R4 = H, C6-20 ary1, C1-20 hydrocarby1) are prepared by treatment of I (X, Y = C1) with ArCR1R2OH (Ar = C6-20 ary1), R1 = R2 = same as above) in the presence of organic bases as RC1 scavengers, filtration of the resulting organic HC1 salts, and washing of the filtrates with alkaline solns. wherein organic bases are recovered from the resulting alkaline waste solns. Thus, pentaerythritol was treated with Pc13 in the presence of NRt3 and substituted with PhC18CHO in the presence of NRt3 to give 95% I (X = Y = OCM2Ph), which was filtered and the filtrate was washed with 1 NR auguous NaOH solution and water. NaOH pellets were added to the waste aquoous NaOH solution, filtered, and distilled to recover 95% NRt3 with purity of 95%.

IT RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP

(Preparation) (Proparation)
(recovery of organic base HCl scavengers from waste alkaline solns. in
environmentally friendly preparation of pentaerythritol spirocyclic
diphosphite by substitution of the corresponding bis(chlorophosphite)
with aralkyl ales.)
7093-28-9 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethoxy)(9CI) (CA INDEX NAME)

3643-70-7P RL: RCT (Reactant); SPN (Synthetic preparation); PREP

10541021-intermediate

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tFraperation), RACT (Reactant or reagent) (recovery of organic base HCl scavengers from waste alkaline solns. in environmentally friendly preparation of pentaerythricol spirocyclic diphosphite by substitution of the corresponding bis(chlorophosphite) with aralkyl alca.) 3643-70-7 CAPLUS

,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro- (CA

AN 2004:92255 CAPLUS COPYRIGHT-2007-ACSFORTSTN

2004/972255 CAPLUS Full-text
140:14529
Environmentally friendly preparation of pentaerythritol apirocyclic diphosphites from their corresponding dichlorophosphite Tando, Kazushi; Tandae, Selichi; Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 11 pp.
CODEN: JKXXAP

APPLICATION NO

20040205 JP 2002-194716

DATE

20020703

KIND DATE

Patent

Japanese

NT 1 PATENT NO.

PI JP 2004035468 A 20040205 PRAI JP 2002-194716 20020703 OS CASREACT 140:146289; MARPAT 140:146289

The title diphosphites I (X = OCR3R4CR1R2Ar1, Y = OCR5R6CR7R8Ar2; Ar1, Ar2 = C6-20 aryl; R1-R4 = H, C6-20 aryl, C7-30 aralkyl, C1-20 hydrocarbyl) are prepared by treatment of I (X, Y = C1) with ArCR1R2CR3R4OH (Ar = C6-20 aryl; R1-R4 = same as above) in the presence of organic bases as RC1 scavengers, filtration of the resulting organic RC1 salts, and washing of the filtrates with alkaline solns, wherein organic bases are recovered from the resulting alkaline waste solns. Thus, pentaerythrical was treated with PC13 in the presence of NEt3 and substituted with PRCH2CH2OH in the presence of NEt3 to give 95% I (X = Y = OCH2CH2CPh), which was filtered and the filtrate was washe with 1 N aqueous NaOH solution and water. NaOH pellets were added to the

10541021-intermediate

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The title diphosphites I (X = OCRIR2Ari, Y = OCRJR4Ar2, Ar1, Ar2 = C6-20 aryl; R1-R4 = H, C6-20 aryl; C1-20 hydrocarbyl) are prepared by heating solns. or suspensions of I (X, Y = C1) manufactured from pentaerythritol and PCI3) at 40-120° under an inert atmospheric, followed by treatenent with ArCRIR2ON (Ar = C6-20 aryl; R1, R2 = same as above) in the presence of organic bases as HCI scavengers. Thus, 20.1 mmol pentaerythritol (Pentarit S) was treated with 41.8 mmol PCI3 in the presence of 1.0 mmol pyridine in toluene under a N atmospheric to give a suspension, which was heated at 80°, cooled, treated with 40.3 mmol PhCN2ON in the presence of 42.5 mmol pyridine to give I (X = Y = OCH2Ph) with selectivity 31.5%.
70.37-16-61, 3,9-8is[(phenylmethylloxy)-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREF

(preparation of pentaerythritol spirocyclic diphosphites by heating solns. or suspensions of the corresponding dichloride under an inert atmospheric

substitution with aralkyl alcs. in the presence of organic base HCl

scavengers)
7093-28-9 CAPLUS
24.4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethoxy)-(9CI) (CA INDEX NAME)

647807-03-2 CAPLUS

4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethoxy)-9CI) (CA INDEX NAME) (9CI)

3643-70-96, 3,9-Dichloro-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane RL: RCT (Reactant); SPN (Synthetic preparation); PREF

10541021-intermediate

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waste aqueous NaOH solution, filtered, and distilled to recover 95% NEt3 with purity of 95%.

waste aquecous ...
purity of 95%.
475101-75-SP
RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PRSP RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)
(recovery of organic base RCI accavengers from waste alkaline soins, in environmentally friendly preparation of pentaerythricol spirocyclic diphosphite by substitution of the corresponding bis(chlorophosphite) with aralkyl ales.
475101-75-8 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethoxy)-(9CI) (CA INDEX NAME)

364)-10-79
RL: RCT (Reactant); SPN (Synthetic preparation); MRSP
IPERDARA (Section: RACT (Reactant or reagent)
[recovery of organic base HCl scavengers from waste alkaline soins. in
environmentally friendly preparation of pentaerythritol spirocyclic
diphosphite by substitution of the corresponding bis(chlorophosphite)
with aralkyl alcs.)
3643-70-7 CAPLUS
2,4,8,10-Tetracxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro- (CA
INDEX NAME)

140:111531
Preparation of high-purity pentaerythritol spirocyclic diphosphites without isolation of dichloride intermediate Tando, Kazushi, Tanabe, Seiichi, Yanagida, Takatsune; Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 12 pp. CODEM: JKXXARP

DT Patent LA Japanese FAN, CNT 1

APPLICATION NO. PATENT NO. KIND DATE DATE PI JP 2004018406 A 400401220 PRAI JP 2002-172653 20020613 S CASREACT 140:111531; NARPAT 140:111531 G20040122 JP 2002-172653 20020613

and

10541021-intermediate

(Preparation); RACT (Reactant or reagent)
(preparation of pentaerythritol spirocyclic diphosphites by heating solns or suspensions of the corresponding dichloride under an inert atmospheric

substitution with aralkyl alcs, in the presence of organic base HCl

scavengers)
3643-70-7 CAPLUS
2,4,8,10-Tetraoxa-J,9-diphosphaspiro(5.5)undecane, 3,9-dichloro- (CA INDEX NAME)

QU26IJFANSMER 12 OF. 24 JACAPUS COPYRIGHT, 2007 ACS ON STN
AN 2004:57503 CAPUS FULL CEXT

140:111530
Preparation of storage-stable and high-purity pentaerythritol spirocyclic bis(phosphite)s

Yanagida, Takatsune; Tanabe, Seiichi; Tando, Kazushi; Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 14 pp. CODEN: JXXXAF

PA SO

DT

DT Patent LA Japanese FAN.CNT 1

DATE PI JP 2004018388 PRAI JP 2002-171214 OS CASREACT 140 PATENT NO. KIND DATE APPLICATION NO. A G200401220 JP 2002-171214 20020612 JP 2002-171214 20020612 CASREACT 140:111530; MARPAT 140:111530

The title bis(phosphite)s I (X = OCRIR2ArI; Y = OCRIR4Ar2; Ar1, Ar2 = C6-20 aryl; R1-R4 = H, C6-20 aryl, C1-20 hydrocarbyl) are prepared by substitution of I (X, Y = Cl) with ArcRIR2OH (Ar = C6-20 aryl; R1, R2 = same as above) in the presence of organic bases as HCl scavengers from -20 to 100° at normal pressure under an inert atmospheric Thus, I (X = Y = Cl) was treated with 200 mol8 PhCH2OH in the presence of 200 mol8 pyridine in toluene under a dry N atmospheric and filtered to remove pyridine-HCl salt, and the filtrate was washed with 0.5 N NoOH solution and water, dried, and concentrated to give 95% I (X = Y = OCH2Ph), with purity 95% and purity retention 100% after storage under dry N for 2 wk.

7093-38-9P RL: IMF (Industrial manufacture); PUR (Purification or recovery); SPN

RR: IMF (Industrial manufacture); PUR (PUTILIZATION OF TECOVERY); SEM (Synthetic preparation); PREP (Preparation) (preparation of pentaerythritol spirocyclic bis(phosphite)s by substitution of the corresponding dichloride with aralkyl alcs. in the presence of organic base HCI scavengers under an inert atmospheric) 7093-28-9 CAPLUS

7093-28-9 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethoxy)-(CA INDEX NAME)

ANSWER 18 OF 24 CAPLUS COPYRIGHT 2007 ACS ON STN

2004:55607 CAPLUS COPYRIGHT 2007;ACSFON,STN 2004:55607 CAPLUS Full-text 140:111529
Preparation of storage-stable and high-purity pentaerythritol spirocyclic diphosphites without isolation of dichloride intermediate Yanagida. Takatsune; Tanabe, Seiichi; Tando, Kazushi; Imamura, Koichi; Ando, Shinichi; Taketani, Yucaka Teijin Chemicale Ltd., Japan Jpn. Kokai Tokkyo Koho, 16 pp. CODEM: JKXXAF Patent
Japanese

PATENT NO. KIND DATE APPLICATION NO. DATE A @2004.07522333 JP 2002-172657 20020613 PI JP 2004018410 A @20050772235 PRAI JP 2002-172657 20020613 OS CASREACT 140:111529, MARPAT 140:111529 20020613

10541021-intermediate

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140:111528

Preparation of storage-stable and high-purity pentaerythritol spirocyclic

Preparation of storage-stable and night-purity pentaerythritol spire bis(phosphite)s

Tando, Kazushi, Tanabe, Seiichi, Imamura, Koichi, Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 14 pp.
CODEN, JKXXAF

Patent Japanese .CNT 1 DT LA

INT 1 PATENT NO. APPLICATION NO. KIND DATE APPLICATION NO.

A (20040122 JP 2002-172652 DATE P1 JP 2004018405 A C201601222 PRAI JP 2002-172652 20020613 OS CASREACT 140:111528, MARPAT 140:111528 20020613

- The title bis(phosphite)s I (X = OCR3R4CR1R2AF1; Y = OCR5R6CR7R8AF2; AF1, AF2 = C6-20 aryl, R1-R8 = H, C6-20 aryl, C7-30 aralkyl, C1-20 hydrocarbyl) are prepared by substitution of I (X, Y = Cl) with ArCR1R2CR3R40H (Ar = C6-20 aryl; R1-R4 = same as above) in the prosence of organic bases as HCl scavengers from -20 to 100° at normal pressure under an inert atmospheric Thus, I (X = Y = Cl) was treated with 200 mol* PhCHCAZOH in the presence of 200 mol* pyridine in toluene under dry N atmospheric and filtered to remove pyridine-HCl salt, and the filtrate was washed with 0.5 N NoON solution and water, dried, and concentrated to give 95% I (X = Y = OCH12Ph) with purity 94% and purity retention 100% after storage in dry N for 2 wk.
 175101-75-07

175107:-75-69
RL: IMP (Industrial manufacture); PUR (Purification or recovery); SPN
(Synthetic preparation); PREP (Preparation)
(preparation of pentaerythritol apirocyclic bis(phosphite)s by substitution
of the corresponding dichloride with aralkyl alcs. in the presence of
organic base HCl scavengers under an inert atmospheric)
475101-75-8 CAPLUS
2,4.8,10-Tetraoxa-3,9-diphosphaepiro(5.5) undecane, 3,9-bis(2-phenylethoxy)(9CI) (CA INDEX NAME)

The title diphosphites I (X = OCR3R4CRIR2AT1; Y = OCR5R6CRTR8AT2; Ar1, Ar2 = C6-20 ary1; R1-R8 = H, C6-20 ary1, C7-30 aralky1, C1-20 hydrocorby1) are prepared by heating solns, or suspensions of I (X, Y = C1; manufactured from pentaerythritol and PC1) at 40-120° under an inert atmospheric, followed by treatment with ArCRIR2CR3R4OH (Ar = C6-20 ary1; R1, R2 = same as above) in the presence of organic bases as HCl scavengers from -20 to 100° in inert atmospheric Thus, 200.5 mmol pentaerythritol was treated with 417.6 mmol PC13 in the presence of 9.9 mmol pyridine (II) in toluene under a N atmospheric to give a suspension, which was heated at 80°, cooled, treated with 417.6 mmol PC13 in the presence of 425.4 mmol 11 at 20°, and filtered to remove IPHC132OH in the presence of 425.4 mmol 11 at 20°, and filtered to remove IIHC1 salt, and the filtrate was washed with 0.5 N NaOH solution and water, dried, and condensed to give 94% I (X = Y * O(CH2)2Ph) with purity 97% and purity retention 100% after storage in dry N for 2 wk.
475101 '5-80°, 3,9-Bis[(2-phenylethyl)cxy]-2.4,8,10-tetraoxa-3,9-diphosphaspiro[5.5] jundecane
RL: IMF (Industrial manufacture); PUR (Purification or recovery); SPN (Synthetic preparation); (preparation) (preparation); (preparation) of pentaerythritol spirocyclic diphosphites by heating solns. or suspensions of the corresponding dichloride under an inert atmospheric

substitution with aralkyl alcs. in the presence of organic base HCl

SCAVENGERS NAME)
475101-75-8 CAPLUS
2.4.8.10-Tetraoxa-3.9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethoxy)-(9CI) (CA INDEX NAME)

3643-70-7P, 3,9-Dichloro-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5,5)undecane
RL: IMP (Industrial manufacture), RCT (Reactant), SPN (Synthetic preparation) PREP (Preparation), RACT (Reactant or reagent) (preparation of pentaerythritol spirocyclic diphosphites by heating solns, or suspensions of the corresponding dichloride under an inert atmospheric

substitution with aralkyl alcs. in the presence of organic base HCl scavengers) 3643-70-7 CAPLUS

and

2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-dichloro- (CA INDEX NAME)

20 of 34 10541021-intermediate Ph- CH2-- CH2-- 0--- P - 0- CH2 - CH2 - Ph

3642-79-7P
RL: RCT (Reactant); SPN (Synthetic preparation); PPSP
(Preparation); RACT (Reactant or reagent)
(preparation of pentaerythritol spirocyclic bis(phosphite)s by substitution
of the corresponding dichloride with aralkyl alcs. in the presence of
organic base HCl scavengers under an inert atmospheric)
3643-70-7 CAPLUS
24.4,8,10-Tetraoxa-3,9-diphosphaspiro[5,5]undecane, 3,9-dichloro- (CA

2.4,8,10-Tetraoxa-3,9-diphosphaspiro{5.5}undecane, 3,9-dichloro- {CA

CU2612ANSHER 15-09-24 2CADLUST COPYRIGHT 2007-ACS-ON_STN_ AN 2004:52790 CAPLUS <u>Pull-text</u> DN 140:111525

140:111525
Preparation of high-purity and storage-stable pentaerythritol spirocyclic diphosphites without isolation of dichloride intermediate
Tanabe, Seiichi; Yanagida, Takatsune; Tando, Kazushi; Imamura, Koichi; Ando, Shinichi; Taketani, Yutaka
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 17 pp.
CODEN: JAXXAF
Patent
Japanese
CNT 1

IN

рΤ

KIND DATE APPLICATION NO.
A 20040122 JP 2002-172656 PATENT NO. JP 2004018409 A 20040127 JP 2002-172656 20020613 CASREACT 140:111525; MARPAT 140:111525

The title diphosphites I (X = OCR1R2Ar1, Y = OCR3R4Ar2, Ar1, Ar2 = C6-20 aryl, R1-R4 = H, C6-20 aryl, C1-20 hydrocarbyl) are prepared by heating solms, or suspensions of I (X, Y = C1, manufactured from pentaerythricol and PC13) at 40-120° under an inert atmospheric, followed by treatment with ArCR1R2OH (Ar =

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21 0134

C6-20 aryl; Rl. R2 = same as above) in the presence of organic bases as HCl scavengers from -20 to 100° under inert atmospheric Thus, 201. mmol pentaerythricol was treated with 415.2 mmol PCl3 in the presence of 10.0 mmol pyridine (II) in toluene under a N atmospheric to give a suspension, which was heated at 60°, cooled, treated with 401.0 mmol PhCH2OH in the presence of 425.5 mmol II at 15-20°, and filtered to remove II-HCl salt, and the filtrate was washed with 0.5 N NaOH solution and water, dried, and condensed to give 95% I (X = Y OCH2Ph) with purity 97% and purity retention 100% after storage in dry N for 2 wk.

7693-28-9P, 3,9-Bis([phenylmethyl)oxy]-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5] undecame 647307-03-21, 3,9-Bis([1-1])

IT 76/3: 25: 39, 3,9-Big|(pheny|metny|)oxy|-2,4,8,10-tetraoxa-3,y-diphosphaspiro(5.5)undecane 6/307:00-21, 3,9-Big|(1)-pheny|ethy|)oxy|-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5.5)undecane RL: IMF (industrial manufacture): PUR (purification or recovery); SPN (Synthetic preparation); PREP (Preparation; (preparation of pentaerythritol spirocyclic diphosphites by heating solns. or suspensions of the corresponding dichloride under an inert atmospheric

and

substitution wich aralkyl alcs. in the presence of organic base HCl scavengers)
7093-28-9 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecame, 3,9-bis(phenylmethoxy)-(5C1) (CA IMDEX NAME)

647807-03-2 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro{5.5}undecane, 3,9-bis(1-phenylethoxy)-(9CI) (CA INDEX NAME)

1843-70 7P, 3,9-Dichloro-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane RL: IMP (Industrial manufacture); RCT (Reactant); SPN (Synthetic preparation); PREP Frequencion; RACT (Reactant or reagent) (preparation of pentaerythritol spirocyclic diphosphites by heating solns. or suspensions of the corresponding dichloride under an inert atmospheric

substitution with aralkyl alcs. in the presence of organic base HCl

scavengers)
3.4-70-7 CAPLUS
2.4.8,10-Tecraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro- (CA
INDEX NAME)

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(preparation of dichlorotetraoxadiphosphaspiroundecane having good (preparation of dichlorotetraoxadiphosphaspiroundecane having good stability
as intermediate for phosphite antioxidants by treatment of PCl3 with pentaerythritol and then heating)
RN 7093-28-9 CAPLUS
CN 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethoxy)-(9Cl) (CA INDEX NAME)

ANSWER UT OF 24 CARUUS GORNRIGHT 2007 ACS on STN 2001:52788 CARUUS Full-text 140:111523
Preparation of high-purity pentaerythritol spirocyclic diphosphites without isolation of dichloride intermediate Yanagida, Takatsune; Tanabe, Seiichi; Tando, Kazushi; Taketani, Yutaka Teljin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 11 pp. CODEN: JKXXAF Patent

Patent Japanese CNT 1 DT LA

PATENT NO.

KIND DATE APPLICATION NO.

A 200401221 JP 2002-172654
20020613 DATE PI JP 2004018407 PRAI JP 2002-172654 20020613

CASREACT 140:111523; MARPAT 140:111523

The title diphosphites I (X = OCR3R4CR1R2Ar1, Y = OCR5R6CR7R8Ar2; Ar1, Ar2 = C6-20 aryl; R1-R8 = H, C6-20 aryl, C7-30 aralkyl, C1-20 hydrocarbyl) are prepared by heating solms. or suspensions of I (X, Y = C1; manufactured from pentaerythritol and PC13) at 40-120° under an inert atmospheric, followed by treatment with ArCRIRZCR3R4OH (Ar = C6-20 aryl, R1-R4 = same as above) in the presence of organic bases as R61 scavengers. Thus, 40.1 mmol pentaerythritol (Pentarit S) was treated with 83.5 mmol PC13 in the presence of 2.0 mmol pyridine in toluene under a N atmospheric to give a suspension, which was heated at 80°, cooled, treated with 80.2 mmol PhCH2CH2OH in the presence of 85.1 mmol pyridine to give I (X = Y = OCH2CH2Ph) with selectivity 93.0%. $4758101.79 \times 79.39.94818 (2-phenylethyl)oxyl-2,4.8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane$

10541021-intermediate

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AN 204:52789 CAPLUS GOFVRIGHT 2007 ACS on STN
AN 204:52789 CAPLUS Full-text
I 140:111524
Preparation of 3.9-dichloro-2,4,8,10-tetraoxa-3,9diphosphaspiro[5.5]undecane having good stability as intermediate for phosphite antioxidant for resins
IN Tando, Kazushi; Tanabe, Seiichi; Taketani, Yutaka
PA Teijin Chemicals Ltd., Japan
S Jpn. Kokai Tokkyo Koho, 9 pp.
COEN: JKXXAF
DT Patent

DT Patent LA Japanese FAN.CNT 1 PATENT NO. APPLICATION NO. KIND DATE JP 2004018408 20040022 JP 2002-172655 20020613

CASREACT 140:111524

CASRRACT 140:111524

3,9-Dichloro-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane (I) is prepared by treatment of Pcl3 (II) with pentaerythritol (III) in organic solvents, heating the resulting solns, or suspensions at 40-120° under an inert atmospheric without isolation of I, and cooling. Thus, 42.0 mmol II was treated with 20.2 mmol III (Pentarit 9) in the presence of pyridine in toluene under N, heated at 60°, and cooled to give a suspension containing I with selectivity 96.5%. Then, pyridine and PhCM2OH were added to the suspension to give 3,9-bis (phenylmethyloxy)-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane with selectivity 94.3%. 361,3-67-77, 3,9-Dichloro-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane
RL: IMP (Industrial manufacture); RCT (Reactant); SPN (Synthetic preparation); PREF (Preparation); RACT (Reactant or reagent) (preparation of dichlorotetraoxadiphosphaspiroundecane having good dity

(preparation of dichlorotetraoxadiphosphaspiroundecame having good stability

as intermediate for phosphite antioxidants by treatment of PCl3 with pentaerythricol and then heating)

RN 3643-70-7 CAPLUS

CN 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecame, 3,9-dichloro- (CA INDEX NAME)

26/3-28-9F, 3,9-Bis(phenylmethyloxy)-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane
RL: IMF (Industrial manufacture); SPN (Synthetic preparation); FREF (Preparation)

10541021-intermediate

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RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP

(preparation of pentaerythritol spirocyclic diphosphites by heating solns. or suspensions of the corresponding dichloride under an inert atmospheric

substitution with aralkyl alcs. in the presence of organic base HCl

scavengers) CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(2-phenylethoxy)-(9CI) (CA INDEX NAME)

2643 78 7P, 3,9-Dichloro-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5,5]undecane RL: RCT (Reactant): 9PN (Synthetic preparation); [FEF ||Freparation!]: RACT (Reactant or reagent) (preparation of pentaerythritol spirocyclic diphosphites by heating solns, or suspensions of the corresponding dichloride under an inert atmospheric

substitution with aralkyl alcs. in the presence of organic base HCl

scavengers)
3643-70-7 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro- (CA

HEZE ANSWER 19 OF 2X CAPLUS COPYRIGHT 2007 ACS ON SUN AN 1994:657137 CAPLUS FULL COXT

121:257137

Carbohydrate-substituted 2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5] undecane

stabilizers

stablizers
Babiarz, Joseph E.; Pastor, Stephen D.
Ciba-Geigy Corp., USA
U.S., 10 pp.
CODEN: USXXAM

so

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DT Patent LA English FAN.CNT 1

PATENT NO DATE APPLICATION NO. DATE KIND PI US 5310891 PRAI US 1992-918326 19940510 19920722 19920722

MARPAT 121:257137

- The stabilizers have the structure I (0 * carbohydrate residue). A solution of 3,9-dichloro-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane in PhMe was treated dropwise with 1,2:5,6-di-0-isopropylidene-0-glucose and EC3N to give a I. Profax 6501 containing Ca stearate 0.075, pentaerythricol tetrakis(3,5-di-tert-butyl-4-hydroxyhydrocinnamate) 0.075, and the I 0.075% showed melt flow rate 2.5 (4,3) g/10 min after 1 (5) extrusion cycles at 274* with 90 s residence time, compared with 4.4 (10.7) g/10 min when the I was omitted. 158808-45-89
- - REL PREP (Preparation)
 (preparation of, as heat stabilizer for polypropylene)
 158808-45-8 CAPLUS

- diphosphaspiro[5.5]undecane-3,9-diyl}bis[1,2:3,4-bis-0-(1-methylethylidene)- (9CI) (CA INDEX NAME)

- 3643-70-7, 3,9-Dichloro-2,4,8,10-tetraoxa-3,9-diphosphaspiro{5.5}undecane RL: RCT (Reactant), RACT (Reactant or reagent) (reaction of, with carbohydrates) 3643-70-7 CAPLUS IT

- 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5,5]undecane, 3,9-dichloro- (CA

10541021-intermediate

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- 2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-dichloro- (CA INDEX NAME)

AN 1979:7681 CAPLUS COPYRIGHT 2007-ACS-ON-STN

- 1979:76
- 90:7681
 Incumescent fire retardant compositions containing pentaerythritol cyclic diphosphates
 Albright, James A.
 Welsicol Chemical Corp., USA
 U.S., 6 pp. Cont.-in-part of U.S. 3.978,167.
 CODEN: USXXAM

- DT Patent LA English FAN.CNT 4

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE	
PI	US 4099975	A	19780711	US 1976-650282	19760119	
	US 3978167	A	19760831	US 1975-616935	19750926	
PRAI	US 1974-429607	A2	19740102			
	US 1975-616935	A2	19750926			

- Pentaerythritol cyclic diphosphates (I, R = haloalkoxy, diethylamino) were propared as intumeacent agents for coatings. Thus, 30 g diethylamine [109-89-7] in 50 mL C6H6 was added to 29.7 g 3,9-dichloro-2,4,8,10-tertacax-1,9-diphosphaspiro[5.5]undecane-3,9-dioxide [?]--2-7-4] in 250 mL C6H6, refluxed 3 h and worked up to give 3,9-bis(N.P- diethylamino)-2,4,8,10-tertacax-3,9-diphosphaspiro[5.5]undecane-3,9-dioxide (I, R = diethylamino) [61090-87-7] m. 189,5-190.5*. An intumescent paint was prepared by mixing com. semi-gloss latex paint 75, chlorinated paraffin wax 5, I (R = diethylamino) 75 and water 10 g.
- 17
- RL: USES (Uses)

- (intumescent agents, for coatings)
 (1090-88-8 CAPLUS
 2.4,8.10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(3-chloro-2,2-dimethylpropoxy)-, 3,9-dioxide (SCI) (CA INDEX NAME)

10541021-intermediate

126 ANSWER 19 OF 24 CAPLUS COPYRIGHT 2007 ACS ON SIN

- ANSWER 1907 2 CAPLUS COPYRIGHT 2007 ACS ON SIN 1986:498557 CAPLUS Full-text
 1986:498557 CAPLUS Full-text
 105:98557
 Derivatives of alkyl-substituted 4-hydroxy-methylpiperidine and their use as stabilizers
 DiBattista, Piero, Nucida, Gilberto
 Ausimont S.p.A., Italy
 EUR, Pat. Appl., 51 pp.
 CODEN: EPSEXDW
 PATENT
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- LA English

·	An.	CNI									
		PAT	ENT	NO.			KIN	D DATE	APE	LICATION NO.	DATE
P	1	EP	1632	45			A2	19851204	EP	1985-106231	19850521
		EP	1632	45			A3	19861105			
		EP	1632	45			B1	19910731			
			R:	BE,	CH,	DE,	FR,	GB, LI, NL			
		CA	1264	743			A1	19900123	CA	1985-481955	19850521
		JΡ	6105	6164			A	19860320	JP	1985-108488	19850522
		us ·	4772	708			Α	19880920	US	1987-28039	19870320
P	RAI	IT	1984	-210	34		Α	19840522			

- IT 1984-21034 A 19840522
 US 1985-736328 A1 19850521
 MARPAT 105:98557
 Alkyl-substituted hydroxymethylpiperidine derivs. are useful as heat, light, and oxidation stabilizers for plastics. Thus, 2,2,6,6-tetramethyl-4-hydroxymethyl piperidine, prepared by hydrogenation of 2,2,6,6-tetramethyl-4-spirooxirane, was transesterified with Me adipate, giving bis(2,2,6,6-tetramethyl-4-methylpiperidine adipate (1). Polypropylene, stabilized by 0.5% I, had embrittlement time 3800 h, vs. 100 without I.
- IT 103928-44-5P RL: PREP (Preparation)
- (preparation of, as stabilizer for polymers)
 103928-44-5 CARUS
 Piperidine, 4,4'-[2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane-3,9-diphosphaspiro[6.5]unde

- RL: RCT (Reactant), RACT (Reactant or reagent) (reaction of, with hydroxymethylpiperidine compds.) 3643-70-7 CAPLUS

10541021-intermediate

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- 71:-07-4
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (reaction of, with dibromopropanol or diethylamine)
 714-87-4 CAPLUS
 2,4,8,10-Tetracxa-3,9-diphosphaspiro[5,5]undecane, 3,9-dichloro-,
 3,9-dioxide (CA INDEX NAME)

ANSWER_SINOF 224 TCAPIUS COPYRIGHT_2000WACS on 9TM,

AN 1977:17625 CAPIUS Full-text
DN 86:17625
TI Pentaerythritol cyclic diphosphates and diphosphoramidates
IN Albright, James A.
PA Michigan Chemical Corp., USA
O U.S., 8 pp.
CODEN: USXXAM
DT Patent

- DT LA

FAN.	CNT	4
	DA.	TE

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PΙ	US 3978167	A	19760831	US 1975-616935	19750926
	GB 1517651	A	19780712	GB 1976-1214	19760113
	GB 1517652	A	19780712	GB 1977-45795	19760113
	CA 1075257	A1	19800408	CA 1976-243559	19760113
	DE 2601278	A1	19770331	DE 1976-2601278	19760115
	DE 2601278	C3	19790503		
	US 4099975	A	19780711	US 1976-650282	19760119
	FR 2325655	A1	19770422	PR 1976-1611	19760121
	JP 52042891	A	19770404	JP 1976-9187	19760130
	JP 57056916	В	19821202		
PRAI	US 1974-429607	A2	19740102		
	US 1975-616935	A	19750926		

Organophosphorus compds. of the formula I, where X and X' = 0 or S and Y and Y' = monovalent halogenated oxyaliph. or oxyalicyclic or -NRR', where R and R' = H, monovalent hydrocarbon, or halogenated monovalent hydrocarbon, were useful as flame retardants for polymers. Thus, 3,9-dichloro-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5] undecane-3,9-dioxide [714-27-4] 29.7, 2,3-dibromopropanol [96-13-9] 43.6, and MgO 0.1g were mixed together, heated 2 hr at 110° to drive off HCl, and cooled to room temperature to give a viscous product which was washed with NH4OH at 60° and then with H2O and dried under a vacuum. The light brown viscous product was 3,9-bis(2,3-dibromopropoxy)-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5] undecane-3,9-dioxide [61090-85-5].

A1096-88-8P RL: PREP (Preparation)

(preparation and flame retardant properties of)
61090-88-8 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(3-chloro-2,2-dimethylpropoxy)-, 3,9-dioxide (9CI) (CA INDEX NAME)

ΙT

714-37 4 RL: RCT (Reactant); RACT (Reactant or reagent)

(reaction of, with alcohols or amines)
714-87-4 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro-, (CA INDEX NAME)

ANSWER 22 OF 24 CAPBUSETCORYRIGHT 2002 ACS-ON-STN

1976:561241 CAPLUS Full-text

85:161241

Polycyclic phosphate esters Batorewicz, Wadim Uniroyal, Inc., USA U.S., 7 pp.

10541021-intermediate

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UPG ANSHER 20 OF 24 CARRUS GOPYRIGHT 2007 AGS ON STA

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N 1963,475330 CAPPUS FULL-Loxt

DN 59:75330

OREF 59:13985n,13986a-d

I Some Chemical reactions of J,9-dichloro-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide

AU Raetz, Rudi F. M.; Sweeting, Orville J.

CS Olin Mathieson Chem. Corp., New Haven, CT

Journal of Organic Chemistry (1963), 28(6), 1608-12

CODEN: JOCEAH; ISSN: 0022-3263

Journal

Unavailable

Journal
Unavailable
Por diagram(s), see printed CA Issue.
Pentaerythritol (I) is treated with POCl3 to give 3,9-dichloroPentaerythritol (I) is treated with POCl3 to give 3,9-dichloro2,4.8.]Otetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide (II) which is
converted to an adduct with HCOKNMe2. II is treated with H20 and diols to give
3,9-dihydroxy-2,4.8.]O-tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide
(III). Thus, a mixture of 272.3 g. I and 660 g. POCl3 is heated 2 hrs. at 90and 20 hrs. at 100°, the solid product mixed with 500 g. POCl3, the mixture
refluxed 2 hrs., the excess POCl3 decanted, and the product heated at 120°/10
mm. The solid is washed 4 times with 200 ml. CCl4 and with 450 ml. cold
absolute EtOH to give 478 g. II, m. 233-5° (HOAC). A solution of 1 g. II in
10 ml. anhydrous HcONNe2 is refluxed 20 ml. cold and with 450 ml. cold
absolute EtOH to give 478 g. II, m. 233-5° (HOAC). A solution of 1 g. II in
10 ml. anhydrous HcONNe2 is refluxed 20 ml. and kept at room temperature, and
excess HCONNe2 is distilled after 3 days to give 1.2 g. IV. \lambda 6.0 ml. A
solution in prepared from 19 g. crude II and 150 ml. anhydrous HcONNe2, 5.75
g. HO(CH2)40H is added, and the mixture is refluxed 40 min. to give 19.0 g.
monodimethylammonium salt, m. 266° (HO(CH2)40H), 97.4 yield, of III. A
mixture of 17.82 g. II and 5.4 g. HO(CH2)40H is heated 1 hr. at 110° and 3
hrs. at 145°, and the mixture distilled at 145°/14 mm. to give an oil and a
residue, and the residue is extracted with hot EtOH to give an insol. solid.
The solid is treated with 50 ml. cold H20 and H20 is evaporated at room
temperature to give 4.4 g. III and the EtOH extract is evaporated to dryness
to give a total of 8.3 g. III, m. 306-7*(HOAC), 53.24 yield. The treatment of
5,94 g. II with 2.28 g. 1,4-bis(hydroxymethyl)cyclohexnea at 195° also gives
III. Crude III monodimethylammonium salt (2.2 g.) is dissolved in 25 ml. H20
and the solution is poured over a Dowex-50-M-X-s column to give 99.8* III. n.
314°, is obtained.
97321-42² (
Deriv

(Derived from data in the 7th Collective Formula Index (1962-1966)) 96732-42-2 CAPLUS

GHydroxymethylene)dimethylammonium chloride, phosphate, cyclic diester with pentaerythritol (7CI) (CA INDEX NAME)

IT 714-87-4P, Pentaerythritol, cyclic diphosphorochloridate RL: PREP (Preparation)

(preparation of)

2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-dichloro-,

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CODEN: USXXAM

FAN. CNT

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PΙ	US 3970726	A	19760720	US 1975-543289	19750123
	ZA 7507361	A	19761124	ZA 1975-7361	19751124
	AU 7587073	A	19770602	AU 1975-87073	19751128
	AU 499115	B2	19790405		
	DE 2559371	A1	19760729	DE 1975-2559371	19751231
	FR 2298553	A1	19760820	FR 1976-1585	19760121
	FR 2298553	B1	19790309		
	JP 51098224	A	19760830	JP 1976-5527	19760122
	PL 105884	B1	19791130	PL 1976-186703	19760122
	NL 7600743	A	19760727	NL 1976-743	19760123
	US 4054543	A	19771018	US 1976-663173	19760302

US 4054543 A 19771018 US 1976-663173 19760302
PRAI US 1975-543289 A 19750123

AB Fireproofing agents for polyurethane precursors to be foamed were made by reacting PCl3 with pentaerythricol [115-77-5] and either oxidizing-esteritying the product. Thus, the spiroadduct [3:54 70-7] of pentaerythricol and PCl3 was oxidized and esterified with ECON to give the Et ester. The latter was mixed with 1-(aminoethyl)piperazine-propylene oxide adduct, methylenebis(phenyl isocyanate), surfactants, curing agent, and blowing agents to give a polyurethane with 0 index 24.5, in contrast with the value of 20.6 when no fireproofing agents was used.

IT 6066-27-2P

G0860-22-2P
RL: RCT (Reactant); SPN (Synthetic preparation); PREP
(preparation); RACT (Reactant or reagent)
(preparation and esterification of)
60860-22-2 CAPUUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-chloroethoxy)(CA INDEX NAME)

3543-70-7P
RL: RCT (Reactant); SPN (Synthetic preparation); PREF (Preparation); RACT (Reactant or reagent) (preparation and reactions of) 3643-70-7 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro- (CA INDEX NAME)

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3,9-dioxide (CA INDEX NAME)

(1/2.5 Kg	ANSWER 24 OF 24 OT CAPUUSE GODYRIGHTS 2000 AGS on ISTN
AN	1963:82866 CAPLUS FUIT-text
DN	58:82566
OREF	58:14223g-h,14224a-b
TI	Pentaerythritol phosphates for use as plasticizers
PA	Agfa AG.

Agfa ... 5 pp. Patent Unavailable PATENT NO. DATE APPLICATION NO GB 1960-39545 19630327 19601117

DE 1155901

DE 1050799

19630521

US 1960-69289

1960115

TOR 1959117

For diagram(s), see printed CA Issue.

Migration and volatility are avoided by using esters of the general formula I, where R and Y are the same or different aryl or alkyl radicals or substituted radicals. Such esters are solvents for most thermoplastic materials. They are made by heating penteerythritol (II) with POCl3 and phenols or alcs., or by heating phosphates in vacuo with OH compds. Thus 136 g. II and 500 ml. POCl3 were heated together on a steam bath. The residual POCl3 was distilled off in vacuo to give about 250 g. acid ester chloride (III), m. 241-5*. III (300 g.) and PhOH 220 were refluxed with 31. CH2Cl2 and 300 ml. EL3N. The CH2Cl2 was distilled and the residue extracted with a mixture of CH2Cl2 and H2O. The EL3N salt entered the H2O phase and the II phosphate ester diasolved in the CH2Cl2. Exporation of the solvent left 300 g. I (R * Y * Ph) (IV), m. 201-2*. Similarly prepared were 1 (R * Y * 4-MeCGE1)11 (from haury latc.); the thick viscous oil I (R * Y * ECCH2CH2)2 (from monoethyl glycol); the viscous oil I (R * Y * CH2Cl2)20(CH2)2) (from B-cyanoethyl glycol); the viscous oil I (R * Y * CH2Cl2)20(CH2)2) (from B-cyanoethyl glycol); the viscous oil I (R * Y * CH2Cl2)20(CH2)2) (from decorphenol). Cellulose triacetate (50 g.) was dissolved in iso-POH 6, CH2Cl2 300, and IV 10 dissolved in CH2Cl2 50 parts was added. The solution was freed of bubbles by heating, then cooled and cast on a plate from which it was attripped when dry. The clear film was suitable for a photographic emulsion support. Similar films were made from IV and polystyrene and from IV and polytoyly chloride). The other esters described were also used to produce suitable (ilms of good mech. properties.

14. 47.4 -5755-59.5.

(Derived from data in the 7th Collective Formula Index (1962-1966)) 17

(Derived from data in the 7th Collective Formula Index (1962-1966))

714-87-4 CAPLUS
2.4.8.10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro-, 3,9-dioxide (CA INDEX NAME)

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97575-98-9 CAPLUS
Phosphoric acid, ester with 3-(2-hydroxyethoxy)propionitrile, cyclic diester with pentaerythritol (7CI) (CA INDEX NAME)

PAGE 1-B

--- CH2 -- CH2 -- CN

4991-19-1P, Ethanol, 2-ethoxy-, phosphate, cyclic diester with pentaerythritol RL: FREN (Preparation) (preparation of) 4991-19-3 CAPLUS Phosphoric acid. cyclic diester with pentaerythritol, bis(2-ethoxyethyl) ester (SCI) (CA INDEX NAME)

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10541021-intermediate 34 of 34 LAST RELOADED: Aug 31, 2007 (20070831/UP).

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